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ABSTRACT

The purpose of this module is to introduce students (grades 10-11) to critical bioethical issues by considering moral dilemmas and knowledge of biomedical advances. The module is organized into 12 topic areas, each containing a dilemma story, introductory reading material, sample student responses, and questions. Dilemmas are essentially brief stories which pose a critical decision to be made by a main character. This decision revolves around conflicts between two or more moral/ethical issues (as identified by Kohlberg) presented in the situation, and it is the moral/ethical implication that provides the thrust for student discussions. Preceding each dilemma are relevant readings or case studies providing basic background information regarding the bioethical issue presented in the dilemma. Questions and sample student responses (representing positions taken by typical students) serve to stimulate thinking about the issues and generating discussions. Issues examined include organ transplantation; kidney dialysis patient selection; drug experimentation; fetal research; human behavior control; mass screening for genetic disorders; the terminally ill; mass screening for psychological disorders; eugenics; infanticide; test tube babies; and recombinant DNA. The module may be used as a separate unit of study, as a mini-course, or incorporated into biology, genetics, civics, history, philosophy, anthropology, health, or family-living courses. (JN)

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PREPARING FOR TOMORROW'S WORLD

Dilemmas In Bioethics

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PREPARING FOR TOMORROW'S WORLD

Dilemmas In Bioethics

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PREFACE

We live in an exciting, rapidly changing, and challenging world—a world highly dependent upon science and technology. Our world is changing so rapidly that we sometimes fail to recognize that much of what we today take for granted as common, everyday occurrences existed only in the imaginations of people just a few short years ago. Advances in science and technology have brought many dreams to fruition. Long before today's school children become senior citizens, much of today's "science fiction" will, in fact, become reality. Recall just a few accomplishments which not long ago were viewed as idle dreams:

- *New biomedical advances have made it possible to replace defective hearts, kidneys and other organs.*
- *The first air flight at Kitty Hawk lasted only a few seconds. Now, a little over half a century later space ships travel thousands of miles an hour to explore distant planets.*
- *Nuclear technology—of interest a few short years ago because of its destructive potential—could provide humankind with almost limitless supplies of energy for peace-time needs.*
- *Computer technology has made it possible to solve in seconds problems which only a decade ago would require many human lifetimes.*
- *Science and technology have brought us to the brink of controlling weather, earthquakes and other natural phenomena.*

Moreover, the changes which we have been experiencing and to which we have become accustomed are occurring at an increasingly rapid rate. Changes, most futurists forecast, will continue and, in fact, even accelerate as we move into the 21st Century and beyond. But, as Barry Commoner has stated, "There is no such thing as a free lunch." These great advances will not be achieved without a high price. We are now beginning to experience the adverse effects of our great achievements:

- *The world's natural resources are being rapidly depleted.*
- *Our planet's water and air are no longer pure and clean.*
- *Thousands of plant and animal species are threatened with extinction.*
- *Nearly half the world's population suffers from malnutrition.*

While science and technology have given us tremendous power, we are also confronted with an awesome responsibility: to use the power and ability wisely, to make equitable decision tradeoffs, and to make valid and just choices when there is no absolute "right" alternative. Whether we have used our new powers wisely is highly questionable.

Today's youth will soon become society's decision-makers. Will they be capable of improving upon the decision-making of the past? Will they possess the skills and abilities to make effective, equitable, long-range decisions to create a better world?

To the student:

This module has been prepared to help you—the student and future decision maker—function more effectively in a rapidly changing world. Other modules in the *Preparing for Tomorrow's World* program focus on additional issues of current and future importance.

To the teacher:

It is our belief that this module—and indeed the entire *Preparing for Tomorrow's World* program—will help you the teacher prepare the future decision-maker to deal effectively with issues and challenges at the interfaces of science/technology/society. It is our belief that the contents and activities in this program will begin to prepare today's youth to live life to the fullest, in balance with Earth's resources and environmental limits, and to meet the challenges of tomorrow's world.

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DILEMMAS IN BIOETHICS

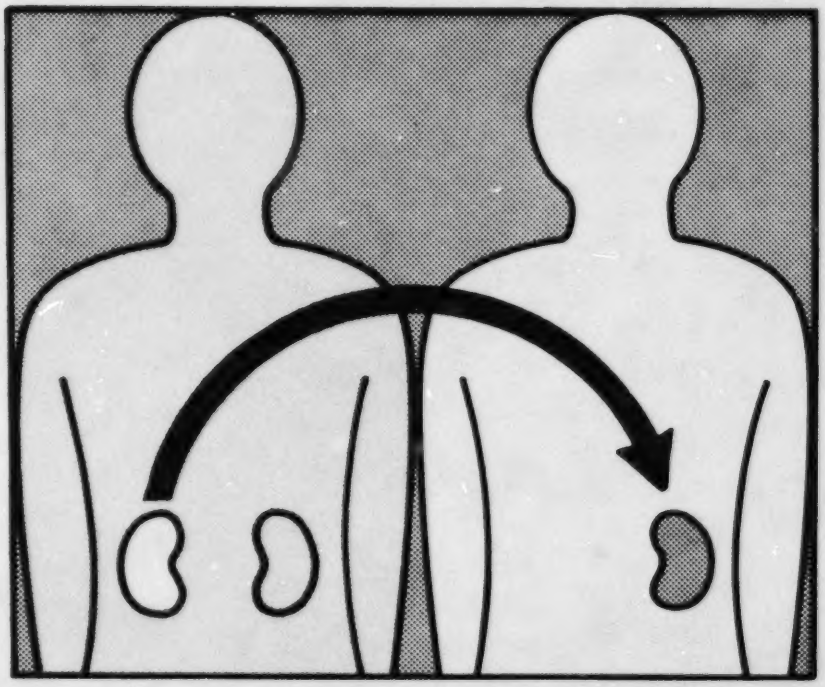
INTRODUCTION

Organ transplantation, artificial organs and limbs, immunization, genetic testing, mind control drugs, and kidney machines are among some of the exciting biomedical advances of the 20th Century. Previously considered natural events such as human reproduction can now be controlled by laboratory scientists. New technologies have rescued the lives of thousands. In a sense, we now have new capabilities to direct and control the course of life from the very moment of fertilization.

Along with new advances, however, have emerged new types of questions and problems. These questions and problems are concerned with human values, needs and the nature of the human experience. For example, it is now possible to fertilize a human ovum in the laboratory and implant it in its natural mother or another recipient. A woman, not wishing to be inconvenienced by nine months of pregnancy, can hire someone to carry her fetus to birth. Who will be responsible for bringing up the child if at the time of birth the mother decides that she no longer wants the child? With this procedure it is possible to select the sex of the child. What changes might take place in society if there are more women than men or vice versa? How might family relations be affected if people can special order the type of child they want? That is, would parents feel differently towards the child who was fertilized naturally but does not possess all the characteristics the parents deem desirable?

Questions of this nature have no one correct or precise answer because so much is unknown and depends upon what people consider important. Many possibilities are ones we have never before experienced. We can, however, begin to learn how to choose wisely. One strategy is to become aware of new technological developments, how they are used and how they might be misused.

In this module, twelve current biomedical topics are highlighted through a series of readings. Associated with each set of readings is a hypothetical dilemma suggested by an actual case history or a future possibility. The dilemmas have been designed to stimulate discussion between yourself and your classmates. It is hoped that the readings and discussions will challenge your thinking about biomedical advances and their accompanying effects on society and your life. Also, your schooling is preparing you to become decision makers, making policies that will affect the course of the future. Among these issues are those concerned with how to best apply our newly discovered medical breakthroughs. By thinking creatively and considering and evaluating a range of alternatives, you will be developing your skills in choosing.



Organ Transplantation

Reading

Issues in Kidney Transplantation[1]

by Jay Katz and Alexander Morgan Capron

For some doctors—particularly surgeons—the artificial kidney's greatest advantage is to restore patients to a state of relative good health in preparation for transplantation of a new kidney. Although the use of kidney dialysis machines and transplantation of new kidneys are often interrelated, they are regarded by many physicians as separate or even competing forms of treatment. Kidney transplants in fact were taking place even before dialysis techniques were being employed.

The first recorded transplantation of kidneys in laboratory animals dates back to 1902. At that time, Dr. Emerich Ullmann of Vienna reported that he had transplanted a dog's kidney to its own neck and a dog's kidney into another dog and also into a goat. The work of Ullmann was soon followed up by that of the noted surgeon Alexis Carrel. Carrel originally started his work on kidneys in France but after 1904 continued his research in the United States. Carrel also conducted his transplantation research using dogs and cats. Carrel's work was later followed up by Dr. C.S. Williamson at the Mayo Clinic in the 1920's. The work of these early pioneers demonstrated that the surgical operations used in kidney transplantation were not difficult to perform and that the transplanted organs functioned well. There is almost immediate production of urine after the vessels had been sutured together and circulation restored.

The first human trial of renal transplantation took place in 1947. A young pregnant woman was admitted in severe shock to the Peter Bent Brigham Hospital. After ten days without urinating she went into deep coma, and death appeared to be imminent. Dr. Charles Hufnagel, a young surgeon who had done considerable kidney transplantation in animals was "on the lookout for a patient in whom a kidney transplant might be needed." In consultation with Dr. Ernest Landsteiner, the urologic resident, and another young

[1]Adapted from *Catastrophic Diseases: Who Decides What? A Psychosocial and Legal Analysis of the Problems Posed by Hemodialysis and Organ Transplantation*, by Jay Katz and Alexander Morgan Capron (New York: Russell Sage Foundation, 1975), pp. 39-51. Copyright © 1975 by Russell Sage Foundation. Used by permission.

surgeon, Dr. David Hume, he decided to give the patient a cadaver transplant "to see if she could be tided over this problem enough to get well." The hospital administrators objected to the operation because of the patient's critical condition. The team of physicians ignored the hospital administrators and carried out the transplantation "in the dark of the night . . . by the light of two small gooseneck lamps." The cadaver organ was attached to an artery and vein in the patient's arm, in which it was partially imbedded. The transplanted organ served its purpose. Within a few days the patient's condition had improved greatly. The cadaver kidney was removed, and the patient's own kidneys resumed normal functioning. However, at this time the artificial kidney was being developed and no further attempts were made at short-term transplantations.

While the artificial kidney made transplantation unnecessary for short-term needs, it only served to increase surgeons' desires to attempt transplantation for chronic or long-term kidney disease. On March 31, 1951, Dr. James J. Scola of the Springfield (Mass.) Hospital transplanted a kidney from a patient with cancer of the ureter into Mr. A., a 37-year-old man whose rapidly declining kidney function and worsening uremia had been temporarily reversed by dialysis. A's condition improved for a few days, but it subsequently worsened and he died of infection and kidney failure on May 7, 1951.

Looking back at the period 1951 to 1953 when a series of transplants had taken place, Frances Moore, Peter Bent Brigham Hospital's Surgeon-in-Chief, recalls that:

"It was hoped that the transplanted kidneys might function longer than was previously reported in animals, or that the general advances in surgery, medicine, and biology would permit some unexpected success in transplantation. There was every reason to expect something new when all the techniques of modern medicine and surgery were applied. This expectation alone justified the undertaking . . . Despite this hope, true success was not forthcoming and a pattern of brief recovery, followed by failure, repeated itself patient after patient."

At the same time, Dr. Peter Medawar and his team of researchers in England were working on immune reactions and rejections—a major problem preventing successful transplantations. Basing their theories on the earlier work of Dr. Emile Holman, these scientists discovered that an animal reacts to a skin graft from another animal as it does to viruses or bacteria. The graft carries with it certain antigens, proteins that excite a cellular response. The host organism puts out other proteins called antibodies which with the help of another substance (the "complement") then destory the invader antigen. Sir Macfarlane Burnet of Australia and Drs. Jack Cannon and William Longmire at UCLA found that the reticuloendothelial system was responsible for the body's response to destroy foreign protein. They concluded that the body produced chemicals which reacted against materials that are "foreign" to it. In later experiments with baby chicks they found that very young chicks were able to tolerate the presence of foreign materials. When skin from a different animal was grafted to newly hatched chicks, the graft "took." If the graft were made on three-day-old chicks, only one percent of the grafts "took," while at fourteen days none of the grafts "took." Medawar, Billingham and Burnet then discovered that rats or human babies will accept a graft if cells from the donor animals were injected when they were fetuses. This also worked with newborns. It seemed that the body could be immunized at an early age so that it would later tolerate the "foreign" material.

Yet, this type of immunization in humans seemed impractical (and even dangerous). The publication of Medawar's work in 1953 only served to confirm the sad experience of the Brigham surgeons as they ended their series of kidney grafts that year: transplantation would be successful only if (1) the antigens of the doner's organ did not call forth a response from the recipient, or (2) if the recipient's rejection mechanism could be weakened or immobilized.

One way of improving the chances for success in transplantation would be to perform the transplant using an organ which was genetically identical to the one replaced—for example, a graft from one identical twin to the other. It was known that skin grafts could be performed successfully between twins; like skin, a person could "spare" a kidney to help his or her ailing twin. In October 1954, the staff at the Peter Bent Brigham Hospital had the opportunity to test this theory when a young man dying of kidney disease, who had a healthy identical twin brother, was referred to them. The doctors decided that it was proper, with the brother's consent, to deprive him of one kidney in the hope of restoring normal kidney function in his ailing twin. The Brigham surgeons placed the healthy organ in the abdominal cavity, near its normal site, attached it to the bladder, and subsequently removed the two diseased kidneys. Within six months the young man was out of the hospital leading a normal life. This success—the first long-term success in kidney transplantation—gave the doctors a "great boost" and had an immediate and far-reaching effect on the entire transplant research effort, both in this country and abroad.

Twin transplants continue to be performed at a fairly even pace. Overall, 82 transplants had been carried out worldwide by June 1, 1974. The longest transplant survivor is a twin who received a kidney 18 years ago; for the period 1951-1966, 85.2 percent of the patients who received transplants lived more than two years, while in recent years, the average two-year survival has been 100 percent.

This is not to say that identical twin transplants are without problems. The major medical difficulty is that transplants between identical twins meet with a modified rejection reaction similar to that experienced with transplants between nonidentical individuals. Thus, even twin recipients have certain problems with rejection reactions. Consequently, some of the suppressive techniques developed such as drugs and serum are now being used on twin recipients to hold down the production of antibodies which seems to lead to major difficulties.

Transplantation in identical twins has also presented the legal issue of whether the operation is permissible in children under the age of consent. As far as the recipient is concerned, it presents no problem: if a minor needs a kidney transplant, permission for the operation can be given by his or her parents or guardian. Yet, when the donor is a twin, he or she will also be a minor, and the law traditionally has not given parents the authority to consent to the removal of an organ if the child does not benefit from the operation.

Although transplants between identical twins have been successful, this technique had limited value because it could only be used in the rare instances when identical twins were involved. If this type of treatment were to have broader application, means had to be found to reduce the impact of the body's natural immune responses. The first method to reduce the impact of the body's natural immune responses was whole body irradiation. This method proved to be too dangerous both in tests with animals and later tests in humans. If too low a dose of X-rays were given, the graft

would not survive; if too high a dose were given, the patient was now unable to produce antibodies to fight other infections. It seemed that the antibody response could be suppressed only at great risk to the patient, leading to an updating of the old saying—"the graft lived but the patient died."

Over the years there were some "freak successes" in suppressing antibody responses. Despite these occasional successes a more precise method of suppression was needed. Hence, from these beginnings has grown up a battery of immunosuppressive drugs which tend to reduce or block the antigen-antibody reaction. However, the proper use of these drugs and how they worked remain a matter of dispute and trial and error. While kidney transplantation is much more effective than it was a decade ago, the unknown aspects of immunology keep it in the category of experimental therapy.

Because of the availability of immunosuppressive drugs, the use of cadaver kidneys has been increasing. The results obtained using cadaver kidneys are not yet as good as those with closely related donors, but they are improving. Cadavers now account for about 70 percent of all transplanted kidneys, and their two-year survival rate has grown from 27.9 percent for 1951-1966 to 46.6 percent for 1971. Yet such positive results for cadaver kidneys remain below those for transplants from live donors.

Of course, the advances in immunosuppression which have been useful in cadaver transplants have also improved related-donor results. The real advantage seems to lie in the less violent rejection reaction which has to be overcome in related-donor transplants. With increased knowledge or molecular biology, "tissue typing" of the kind originally developed by the French transplanters has played an increasingly important role in kidney grafting. Dr. Paul Terasaki of UCLA has developed an automated, routine method of typing cells from minute samples of white blood cells. The antigen system is similar to the ABO system for blood typing but it is much more complex. Terasaki's work and that of Dr. F.T. Rapaport have shown the need to crossmatch donor and recipient before grafting. Yet, knowledge of antigens is still rudimentary. Present measures are not adequate to assume that well-matched kidneys will "take" even when employed in conjunction with immunosuppressive drugs. Nevertheless, tissue-typing appears to be well established today as a central part of renal transplantation. This raises important issues for physicians and the public in deciding how good a match should be before undertaking the transplantation, as well as problems about how kidneys should be pooled and shared among potential recipients.

One additional medical difficulty should be noted. The use of immunosuppression has not been an unmixed blessing. These powerful agents do not only open the patient to the danger of powerful side-effects, such as infections and psychological disturbances. It now appears that these drugs create increased likelihood of cancer. This is ironic since some of these immunosuppressives were originally developed from drugs used in even greater dosages to combat cancer. A tumor may also be unwittingly transplanted along with the new kidney, or it may be dwelling unnoticed within the recipient. In either case, the immunosuppression permits tumors to grow at an unusally fast rate. It is not clear which drugs have what effect in the complex human system. Since extensive immunosuppression has come into use only recently, there is concern among physicians that the increase in tumors is only now beginning to be detected. The incidence may be even higher than is now suspected.

Dilemma 1 — NEEDED: A NEW KIDNEY — WHO DECIDES WHAT?

The following is adapted from Strunk vs. Strunk, Court of Appeals, Kentucky, September 26, 1969, Ky., 445 S.W. 2nd 145

Arthur L. Strunk, 54 years of age, and Ava Strunk, 52 years of age, of Williamstown, Kentucky, are the parents of two sons. Tommy Strunk is 28 years of age, married, an employee of the Penn State Railroad and a part-time student at the University of Cincinnati. Tommy is now suffering from chronic glomerulus nephritis, a fatal kidney disease. He is now being kept alive by frequent treatment on an artificial kidney, a procedure which cannot be continued much longer.

Jerry Strunk is 27 years of age, incompetent, and through proper legal proceedings has been committed to the Frankfort State Hospital and School, which is a state institution maintained for the feebleminded. He has an I.Q. of approximately 35, which corresponds to the mentality of a six-year-old. He is further handicapped by a speech defect, and has difficulty communicating with persons who do not know him well. Therefore, visits with his family, and especially his brother Tommy, with whom he identifies closely, is a very important element in his life.

When it was found that Tommy needed a kidney, doctors considered the possiblity of using a kidney from a live donor. The entire family—his mother, father, and a number of relatives—was tested. Because of incompatibility of blood type or tissue, none were medically acceptable as live donors. As a last resort, Jerry was tested and found to be highly acceptable. This immediately presented the legal problem as to what, if anything, could be done by the family to procure a transplant from Jerry to Tommy. Since Jerry is officially a ward of the state, the mother petitioned the county court for authority to proceed with the operation.

Should the court permit the transplantation to take place? Why or why not?

SAMPLE OPINIONS

Alice

"No. Why should Jerry be forced to risk his life? There is no way of making sure that the transplant will work. It is possible that the parents might lose both sons. If that happened, the parents would never forgive themselves for making such a decision. The operation might also have a great emotional effect on Jerry. After all, he really can't understand what is happening and what is being done to him. The operation and side effects of having only one kidney could also worsen his mental condition.

If I were in Jerry's place I certainly wouldn't want someone else, especially a group of people I don't even know, such as the court, to decide to remove my kidney. It's also not fair for the mother to force one son to give up part of himself to another son. In this case it seems that Tommy is considered more important because he is normal and successful, while Jerry is just put away and is important only for his working kidneys. If they care about Jerry and consider his needs, why did they have him committed to a state hospital?

They should also think about the discomfort and pain that Jerry could experience from the operation. What if Jerry's one good kidney became infected?"

Bob

"Yes, permission should be given for the transplant. You have to think about the best interests of everyone involved. Tommy will die if he doesn't receive a kidney. If there is any chance that his life can be saved without much risk, it should be taken. Also, Jerry's psychological and emotional well-being must be considered. His life would be empty if he no longer could visit with his brother, whom he loves. To have someone who loves you is important for anyone, but perhaps even more so for someone confined in a mental hospital.

The courts, in acting on behalf of a person unable to make a rational decision, should make decisions based on what that person would normally do. In nearly all cases where a family member is asked to donate a kidney to another they do so without the least hesitation. Therefore, Jerry would consent if he were able to act for himself.

From a medical standpoint, I understand that kidney transplantation has been perfected to the point where it is almost a routine operation. So the risks are probably minimal anyway."

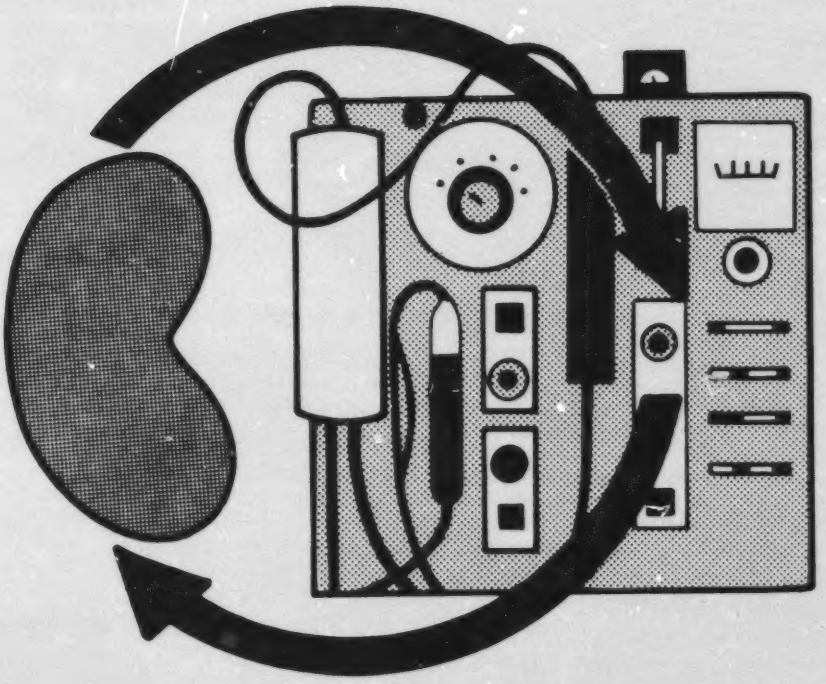
Jerry

No. This is an extremely difficult decision to make, but I think that the court should not permit the transplantation. I'm torn between the desire to save a person from death and yet protect unfortunate members of society who cannot protect themselves. We don't have a right to take advantage of the feebleminded for the benefit of another if he or she does not truly benefit from the action. In this case, the life of Jerry is placed in unnecessary peril. Even though the risk is light, a risk is still involved.

The court must do its best to protect the incompetent and see to it that their rights and well-being are not violated. Permitting the transplantation reduces Jerry's state of well-being, however minimal it may be. Jerry is a human being and his right to life, as everyone else's, should be respected. When one gives part of one's body one should do so freely and with full understanding. Jerry doesn't have this freedom of choice. If the court allows the operation this time, it is opening the way for future removal of organs from people who can't choose for themselves."

DISCUSSION QUESTIONS

- What should be the most important reason for the court to consider in making its decision? Why?
- Would the situation be any different if Jerry needed the kidney and Tommy was the only suitable donor? Why or why not?
- How important is it for the court to follow the wishes of the parents? Why?
- What obligations should parents have towards their children? Under what circumstances do parents have the right to decide for their child if he/she is unable to decide for himself/herself? Why?
- Can one justify making a decision for a mentally incompetent in order to save a life? Why or why not?
- Much expense and effort is needed to care for Jerry in the mental institution; should he be expected to make some contribution to benefit another person? Why or why not?
- If Jerry were normal but not of legal age, should his parents have the right to make the decision for him? Why or why not?
- Jerry has shown great affection towards his brother Tommy, and his visits with him always bolster Jerry's spirits. Is this a good indication that he would want to do what he can to save his brother Tommy? Why or why not?
- If it were known that the transplanted kidney would be functional for only a year, would it make any difference in the decision? Why or why not?
- Would the decision be different if Tommy was just a close friend? Why or why not? A stranger? Why or why not?



Kidney Dialysis
Patient Selection

Reading

Issues in Kidney Dialysis Treatment[1]

by Jay Katz and Alexander Morgan Capron

INTRODUCTION

It has been estimated that over 28,000 people die each year from some form of primary kidney disease. Another 70,000 people die annually from hypertension . . . and many of these deaths can be traced to inadequate kidney function of one form or another. A large percentage of kidney disease can also be traced to early childhood kidney infections that do not exhibit any symptoms until later in life.

The idea of treating patients using an artificial kidney began in the 1930's. This technique was also used during the Second World War to help patients with acute kidney trauma. During that time, however, doctors often faced the problem of finding ways of connecting the patient's veins and arteries to the machine. That is, each time treatment was needed, a new vein and artery location had to be used. After a while, of course, "good sites" on the patient's body became difficult to find. Finally, in 1960 Dr. Scribner in Seattle, Washington developed the Teflon-shunted cannulas that opened the way to treatment of chronic kidney disease using the present hemodialysis procedure.

Today there are over 500 centers offering treatment to 40,000 patients. However, of the more than 7,000 candidates for treatment each year, only a small portion are accepted into the dialysis program.

What is Kidney Dialysis?

Due to various kinds of kidney diseases a person's kidneys might not be able to perform their normal function of cleansing waste products (such as urea, phosphate, potassium and uric acid, among others) from the blood. Since these wastes are toxic, they cannot be tolerated by the body for more than a few days.

An effective way of compensating for kidney failure is to remove toxic substances from the blood by an "artificial

[1]Adapted from *Catastrophic Diseases: Who Decides What? A Psychosocial and Legal Analysis of the Problems Posed by Hemodialysis and Organ Transplantation*, by Jay Katz and Alexander Morgan Capron (New York: Russell Sage Foundation, 1975), pp. 39-51. Copyright © 1975 by Russell Sage Foundation. Used by permission.

kidney"—a machine resembling a wash tub, which, when connected to the patient cleanses the blood. The apparatus is comprised of several parts. A stainless steel tub which holds about 25 gallons of water makes up its bulk. To this is added a bottle of concentrated dialysate, a brine-like solution with the many chemical properties of blood. A hollow rod in the tub attaches to a coil which holds a cellophane-like membrane, and it is in this area that dialysis actually occurs. The membrane will be filled with the waste-ladden blood of the patient, and while a circulating pump keeps the dialysate-water solution surging around the membrane, the waste products filter out from the blood and into the solution. Both ends of the coil are attached to tubing which in turn are attached to the patient's arm vein by two large hollow needles—one carries blood from the body while another returns it cleansed.

The dialysis procedure is a complex affair. It demands constant monitoring by either the patient or the attending operator. Several things can go wrong. The pressure of the machine may become too high, causing the blood pump to turn off. If the patient's blood pressure drops too low because of excessive loss of fluid, dizziness and muscle cramps result and a salt solution must be added by the machine to counter these effects. The connections between tubing and machine can loosen or the tubing itself may split. Probably most crucial, the membrane itself can rupture and spill out about a pint of the patient's blood. The operator must watch the pressure gauge and adjust it occasionally. He/She must also make sure that the heating element is keeping the dialysate bath at the right temperature, watch that the membrane has not sprung a leak, and also observe the air chamber (attached to the tubing leading back to the patient) for bubbles which indicate that a loose connection is allowing air to mix with blood.

Restrictions Imposed on Patients

The time spent on the dialysis machine—the approximate average time is five hours for each of three days a week—is not the only restriction imposed on the hemodialysis patient. The patient's diet can contain only limited amount of fluid because it is important that no greater amount of fluid accumulate than the dialysis will be able to remove. An excess of fluid in the body will make the blood pressure rise, leading to a possible heart attack or stroke. Solid foods must also have a low-water content, be unsalted, and low in potassium since too much of this element in the blood can stop the heart. Aside from dietary restrictions, the patient's dependence on the "artificial kidney" means that travel can be no farther than two days away from a machine. To use a machine away from home entails making complex arrangements weeks in advance.

How Expensive is the Kidney Dialysis Process?

Typically, kidney dialysis machines are gravely outnumbered by the people who need the use of them. They are also very expensive. For example, dialysis therapy for each patient costs approximately $25,000 annually if used at a hospital or kidney dialysis center, and about $8,500 if a machine is leased and used at home. The actual cost per patient, however, is often only a percentage of these figures. For example, Medicare covers 80 percent of almost all hemodialysis costs, and other medical insurance carriers usually pick up substantial portions of the remaining costs. Because of the lack of adequate storage space for the machine and the necessary medical supplies, and perhaps also the lack of someone to perform the procedure, some patients cannot dialyze at home, and they must occupy one of the machines at a dialysis center. Providing therapy at a center is more expensive due to added manpower requirements and the scarcity of available machines.

How are Patients Selected for Kidney Dialysis?

Many kidney centers follow a policy of accepting patients on the basis of their "place in line." Each request is placed on a waiting list and a psychosocial analysis of the patient is done as a preliminary acceptance procedure. The psychosocial analysis seeks to identify any problems the patient might have, and this information, together with information the center's staff has on problems which are known to result from dialysis treatment, form a psychological profile of the future dialysis patient.

Such a profile is deemed necessary to judge the ability of a person to be a successful hemodialysis patient, for there are definite burdens the patient will have to accept. The patient must accept the fact that he/she will spend about fifteen hours a week "attached" to a machine. The strict dietary regime that must be followed will constantly serve as a reminder of his/her health condition when away from the machine. Because of the necessity to stretch one's fluid intake allotment over the several days between dialysis it is necessary to consume only small amounts of liquid at any one time. A large glass of water is a luxury which cannot be afforded. Such deprivations of normal eating and drinking habits may be unbearable to some patients. An occasional lapse of discipline is common to every patient, but a continued laxity tends to indicate that the patient is not as serious as he/she might be in handling his/her particular health problem. A proper diet works together with scrupulous dialysis technique. An inadequacy in one undermines the other. A patient who obviously is not trying hard enough to follow the prescribed diet presents problems to the staff at a dialysis center. The patient must cooperate fully if satisfactory results are to follow.

Although each individual is put on a waiting list, not every one will receive the treatment. Because there are a limited number of kidney machines to be utilized, only a small portion of the people who request machines can be accepted. Some centers in their selection process include the criteria "desire to live," because high motivation is tantamount to staying on the rigorous treatment schedule and strict diet. Some of the early patient selection committees considered the patient's profession, his/her dependents, ability to incur the expense, and residency in state offering the treatment. Age was also a factor in their selection, for it was felt that persons over 45 are less desirable candidates because prolonged kidney dysfunction also affects other organs (heart, liver, lungs) which complicates return to a "normal" active life. Increasingly, the selection process adopted by many centers is to take the next person in line of application. While this is ostensibly the rule, it is altered occasionally. A patient who is next in line can try to assure his/her qualification by diligently maintaining his/her diet, but he/she will also be subject to a critical review of his/her present health condition. Guidelines for choosing candidates for hemodialysis attempt to be objective but, nevertheless, are determined as a response to the individual patient in question.

Dilemma 2 — THE LINE-UP FOR A KIDNEY MACHINE — YOU DECIDE

Martin Crawford, 52, is a dentist with a wife and five children—three of them attending college. He is a patient as well as a personal friend of Dr. Nelson Plummer. Dr. Crawford has had a chronic kidney disease for several years. Until now, the ailment has been controlled by a restricted diet and medication. As a result, Dr. Crawford has managed to go on practicing dentistry and leading a relatively normal life. He is a highly respected and active member of his community. Besides maintaining a full patient schedule, he often volunteers his professional services free of charge at a local dental clinic. In recent weeks, however, Dr. Crawford's condition has grown steadily worse, reaching the critical stage at which toxic uremia is affecting his heart and liver.

Paul Larsen makes his home in a low-rent apartment complex and has been unemployed for nearly three months. He did not complete high school, nor was he trained in any vocation. He, therefore, has had difficulty finding a job. He realizes that he cannot collect unemployment pay indefinitely and is becoming increasingly frustrated because of no job opportunities. Because of his bleak future prospects, he has started to use drugs and drink heavily. This aggravated a previously undiagnosed congenital kidney abnormality. His case was also diagnosed by Dr. Plummer, and he was immediately placed on the waiting list for dialysis machine treatment. His disease is in its early stages. If adequately treated Paul can lead a relatively normal life with somewhat limited physical activity.

There is one opening for dialysis treatment at the center, and Mr. Larsen is next in line. However, Dr. Crawford's condition is deteriorating so rapidly that he requires immediate dialysis treatment. If he does not receive the treatment, he will probably die within the next few weeks.

Should Dr. Plummer select Paul Larsen who is "next in line" to be the next dialysis user, or should he select Dr. Crawford whose situation is more critical? Why?

SAMPLE OPINIONS

Kathy

"No, Martin Crawford should be the next dialysis patient because of his more critical condition. Dr. Plummer has known Dr. Crawford for a long time; he can sympathize with what his friend has gone through and should admire how he has been able to cope with his disease. Dr. Plummer probably feels a certain obligation to Dr. Crawford and his family; that is, an obligation to do what is expected of a friend. The family probably trusts that he will choose Dr. Crawford. If he does not, he will have let them down immensely and will lose their respect. If I were Dr. Plummer, I would care about what Dr. Crawford and his family think of me. I would care about my image as a "good doctor." How can a patient think his doctor is "good" if his doctor decides against medical treatment for him?"

John

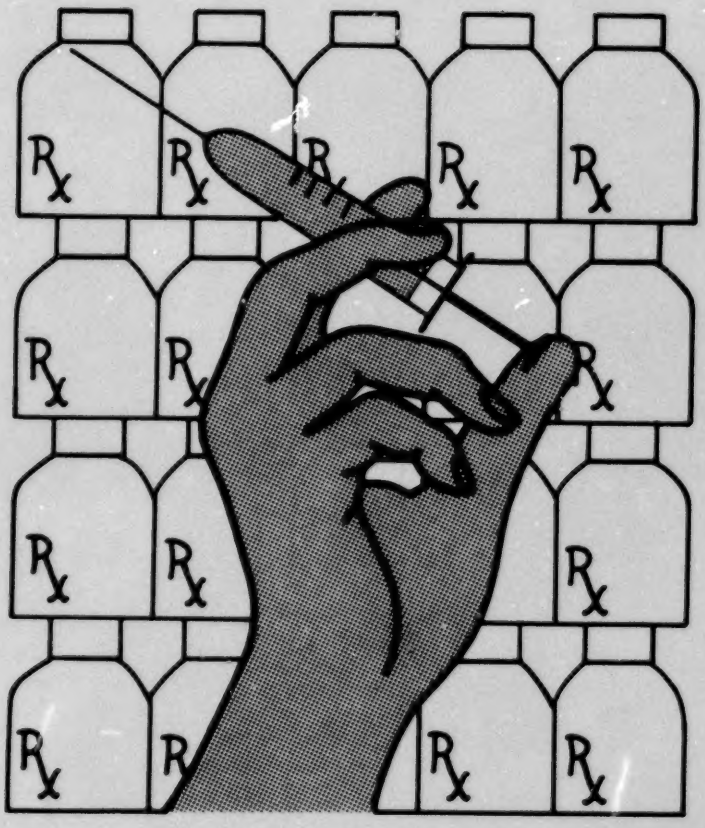
"Yes, Paul Larsen should be the next dialysis patient because he can benefit the most from the treatment. He is almost thirty years younger than Martin Crawford; his renal disease is not as advanced and so his condition will be more responsive to treatment. He has better chances of survival over a longer period of time, and so offers an attractive opportunity to show medicine at its best. Dr. Plummer in selecting Larsen will uphold the philosophy behind the Hippocratic Oath—to treat to the best of his knowledge and ability. The response of Paul Larsen to treatment will be more dramatic than that of Dr. Crawford. To provide "optimum manifestations of life-giving medicine" is after all, Dr. Plummer's obligation as a doctor. It is his duty to society as a physician to seek the best medical result."

Cindy

"Yes, Paul Larsen should be the next patient for hemodialysis. I think that the issue in this case is the importance of saving a life. This is a basic principle in human society. In this particular situation, a life-saving limited resource cannot, unfortunately, be obtainable by everyone. One must decide on the fairest way of providing everyone a chance to use it. The best rule would be to distribute the limited resource on a "first in line" basis. Ideally, everyone who has need of such a machine should have access to one. Since this is not possible, the most impartial way is one which does not recognize one life as superior to or more valuable than another. Because of this reason, Dr. Plummer should follow the procedure of choosing the person next in line because it best upholds the value of life. It is the only practical way of following the principle that everyone's life is of value."

DISCUSSION QUESTIONS

- What criteria should Dr. Plummer use in selecting the most suitable candidate for the dialysis treatment? Why?
- If you were the doctor and the patient was your best friend, how would you decide? What does friendship mean to you?
- Should success of "recovery" become an important consideration in the decision? Why or why not?
- Should the needs of Dr. Crawford's family be taken into account in the decision? Why or why not?
- Should a person who has contributed a great deal to society be specially favored when he/she is in need of help? If the patient were a very important person, such as the President, and all available machines were in use, should another person be asked to vacate his/her place? Why or why not?
- What should be Dr. Plummer's obligation to Mr. Larsen? To Dr. Crawford? Why?
- What is the role of trust in the relationship between doctor and patient? What should be the qualities of a good doctor? Why?
- What patient selection process best upholds the values of human dignity? Why?
- In selecting candidates for dialysis, should the doctor take into account the patient's motivation to live as an indicator of how well he/she can maintain a strict diet, follow the treatment schedule (keeping appointments, taking the prescribed medication faithfully, etc.) limit his/her physical activity and understand the rigid requirements of the treatment? Should age also be a factor? Why or why not?
- What should be society's responsibility to those who cannot afford medical treatment? Why?
- Is it fair to treat a patient who has the more critical need rather than the one "first in line"? How might you feel if you were first in line and asked to relinquish your place? Why?
- Should a doctor have the privilege of selecting who he/she wants to treat? Why or why not?



Drug Experimentation

Reading 1

Medical Science, The Clinical Trial And Society

by Robert Q. Marston, M.D.

The intensified need for medical knowledge today leaves many of us balancing two related concerns about research on human beings.

The first is dedication to the protection of all individuals involved as subjects of medical research.

The second is recognition of the need for research on human beings —and a feeling that it would be immoral not to carry out necessary research.

The need for scientific knowledge is intensified today because doctors have never before been in a position to produce so much positive good on one hand, or harm on the other, through the double-edged potency of their therapeutic weapons.

Rene Dubos spelled out some of the potential dangers from the tools of medical science in these words: "Who could have dreamt a generation ago that hypervitaminosis would become a common form of nutritional disease in the Western world?. . .and the use of x-rays would be held responsible for the increase in certain types of cancer? That the introduction of detergents in various synthetics would increase the incidence of allergy?. . .that advances in chemotherapy and other therapeutic procedures would create a new staphylococcus pathology?. . .that patients with all forms of iatrogenic diseases would occupy such a large number of beds in the modern hospital?"

This very progress is the compelling reason for a continuing and close examination of the relations between medical science and clinical trials—and other research involving human subjects. We are dealing with a dynamic, everchanging base of substantive knowledge. Sometimes the progress of a research project itself moves the state of knowledge so rapidly that serious and involved ethical problems arise concerning the continuation of that same experiment.

For example, in Sir Austin Bradford Hill's article, "Medical Ethics and Controlled Trials," he described the complex

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situation which arose in a trial of long-term therapy using anticoagulants in cerebrovascular disease. He relates, "In previous uncontrolled studies there was a distinct if inconclusive suggestion in favor of their [anticoagulants] use, and sufficient indeed, to make a trial difficult. Yet when put to the test of a controlled trial, with the comparison of a fully treated group and a group given a dose insufficient to interfere with the clotting mechanism, it not only appeared that no protection was afforded against the recurrence of cerebrovascular accident, but there was a small but definite risk of cerebral hemorrhage in the fully treated cases. Here we have an instance—and by no means unique—of the wheel turning full circle. At the start of the trial was it ethical to withhold the treatment? At its end, was it ethical to give it? It is very easy to be wise (and critical) after the event; the problem is to be wise (and ethical) before the event."

There are several obvious reasons why research involving human beings must be carried on. First, in many instances, there may not be a suitable animal model. Second, even if such an animal model exists, there always comes a time at which the test must be carried out in man. Finally, and most relevant to this discussion, is the need to test definitively in humans the procedures and therapies which are already part of the practice of medicine. The potency of modern procedures and therapies is such that the experimental method is often the only effective way to determine if their benefits are outweighed by undue hazard.

I have already quoted from Bradford Hill concerning the use of anticoagulants in the prevention of stroke. We have recently concluded scientific studies in the use of oral hypoglycemic agents to control diabetes from which it has been possible to identify an increased risk from the use of such drugs. Studies concerning the side effects of smallpox inoculation, balanced against the need for such inoculations in this country, have led to a modification in recomendations concerning the use of smallpox vaccine. Each branch of medicine has similar examples demonstrating the role of ignorance as a dominant deterrent in the achievement of effective health programs.

We stand today at a point at which there is a need and opportunity to strengthen markedly the scientific basis of medicine to the advantage of all. However, the need and opportunity exist at a time when (1) there is a trend back to "trial and error medicine," (2) there is a failure even in the health professions, as well as the public at large, to recognize the need for and the value of randomized clinical trials, and (3) there is increasing concern about the welfare of individuals involved as subjects in research.

Let me turn now to my second major theme. How best can we be sure that we protect the rights of individuals involved in clinical research? Many of you in this audience are well aware of the many articles and books on the ethical aspects of the use of human subjects for research. A number of bills relating to scientific experiments involving human subjects were introduced in the last Congress, reflecting a growing interest in the subject. I was particularly anxious that at NIH we interpret and enforce reasonable policies derived from basic and universal moral tenets as well as from requirements for sound scientific work. It seemed important also that as we reviewed our policies we took into account the changing social, technical and political trends and even economic developments. New dimensions in medicine itself are creating changes. For example, the basis for choosing recipients of kidney transplants was a nonquestion until such transplants became feasible. Now it is an ethical problem to be solved.

About 1965, NIH led the way in the development of special policies and procedures to protect individuals involved in the experiments we support. Subsequently, we made clear our interest in the ability of institutions to monitor adequately processes they had set up to protect individuals regardless of the source of research support.

The current policy statement of the Department of Health, Education and Welfare, which is based on the NIH-developed statement, emphasizes the grantee's basic responbilities for safeguarding the subjects' rights and welfare and requires:

- That no grant or contract for such activity be made unless the application has been reviewed and approved by an appropriate institutional committee.
- That the committee determine that the rights and welfare of the subjects involved are adequately protected, that the risks of an individual are outweighed by the potential benefits to him or by the importance of the knowledge to be gained, and that informed consent is to be obtained by methods that are adequate and appropriate.
- That the committee be responsible for continuing review of the activity in keeping with its determinations.
- Determination that informed consent is to be obtained by methods that are adequate and appropriate.

It seems obvious that the first two criteria are the most critical to the ultimate decisions of any review group. Whether or not consent is in fact informed is admittedly difficult to assess. We often are in an uncertain situation in which inadequate information, communication problems, and the inability of the subject to comprehend—or to read—or to listen—can be misleading.

However, even as I assert that the NIH-DHEW policy has been effective, I believe that more discussion, more visibility and clarification of the guidelines in some areas is needed today. Our policy is essentially egalitarian. It makes no distinctions as to race, color or socio-economic status. For instance, it touches only lightly on the handling of subjects with what it calls "limited civil freedom," a classification which includes prisoners, residents of institutions for the mentally retarded and mentally ill, and minors.

The policy assumes that the medical scientist similarly makes no distinctions in the choice of research subjects, except as his research interests are in diseases of a particular race, common in a certain socio-economic group, or limited to a particular hospital or institutional population.

Unfortunately, this is not always the way it is.

Many of our major research institutions are located in the large cities and their patients are drawn primarily from the disadvantaged groups crowded in the center city. Thus, research tends to be concentrated in these groups.

Medical research trials frequently require that a convenient stable subject population be followed over a period of weeks or months rather than days or hours. The medical scientist naturally turns to groups whose availability can be controlled —hospitalized patients, institutionalized patients, medical students, and prisoners. Much research, particularly that which involves appreciable risks and requires frequent monitoring, is concentrated in such groups.

I believe that the time has come when we must recognize that the risk of involvement in research is not distributed as uniformly among the nation's citizens as is the possibility of benefit from the products of this research. I expect that the commission reviewing the Tuskegee syphillis study will ulti-

mately address itself to this problem.

Meanwhile, I would suggest three specific steps, for those situations where some significant risk is involved in research with human subjects:

1. To develop regulations to strengthen the protection of subjects having "limited civil freedom" by convening a series of workshops broadly representative of all concerned groups to discuss and refine the regulations and the implementation of guidelines.

2. To undertake an examination of possible methods of compensation for subjects who, in spite of all precautions, are harmed by research activities.

3. To realert the scientists and administrators concerned with the research process, and to generate greater visibility for existing regulations and procedures. One way would be by insuring that all applications involving significant risk be specifically flagged for the attention of Advisory Councils throughout NIH. The quality of research design and a high probability of obtaining definitive answers must receive special consideration where potential hazards to humans are a part of the price of doing the research.

Any financial compensation to subjects should be reasonably related to the prices paid for other services and not be so high as to constitute undue inducement. There should be a clear statement that neither participation in the proposed research project nor withdrawal from it will materially affect the conditions or terms of any subject's institutional confinement.

In the case of the hospitals for the mentally ill and retarded, the research supported would be restricted to that which (a) is directly concerned with the issues of mental illness, mental health or mental retardation, or (b) will potentially benefit primarily a class of persons commonly confined to a hospital for the mentally ill or retarded, or (c) which will lead to such knowledge important to the prevention of mental illness or retardation that may reasonably be expected to reduce the need for such hospitalization.

Special attention will be given to the requirement that the risk-benefit balance is understood by the subject and that no undue inducement be offered.

I would not like to depart from the subject of research involving children without commenting on the peculiar conflict between the medical needs of children as a class and the requirements of our laws. It is a medical fact that children are not small adults. They have their own diseases and the react differently to what are thought of as adult diseases. The Food and Drug laws require that drugs be tested in all age groups for which a drug is intended.

Yet, under English common law, no parent, no next of kin, or legal guardian can consent to the involvement of any child in a research project not intended for the good of that particular child. Thus, the law is not entirely consistent with the needs of children as a class, and particularly with the needs of mentally retarded children.

As I said earlier, if, in a specific case, I were forced to choose between the individual and the general welfare of society, I would choose to protect the individual. But, in the real world we must have both individual and social welfare. And in the real world, the day by day decisions are not made in Washington, nor can they be guaranteed by assertions by the Director of NIH nor the Secretary of HEW. The responsibility ultimately must rest with the individual institutions, as well as with the individual investigator and physician, while they must maintain both a sensitivity to the possible adverse effects of their therapies, and an increased appreciation of the need to replace ignorance with knowledge. Finally, the new knowledge, which will benefit all of society, must not be gained at the expense of any individual or any segment of society.

Reading 2

Human Experimentation — The Ethical Questions Persist

by Robert M. Veatch and Sharmon Sollitto

In 1966 a Harvard anesthesiologist shocked the biomedical research community by publishing in the New England Journal of Medicine the methods used in twenty-two experiments on human subjects. The material presented below, a summary of the research designs of 11 studies selected from a collection of 43 questionable experiments, suggests that the problem is still vast.

The tragic fact is that less than 25% of the studies in our file claim that consent was obtained from the participants in the research and not one paper documented the nature of the information given to the subjects in conjunction with their consent. It is a very rare scientific article which explains the nature of the consent procedure, a deficiency which must be corrected. Nevertheless, we have in no instance used the lack of consent as a criterion for inclusion in our set of articles. They must have raised more provocative ethical questions. It is impossible to say for sure that each of the studies mentioned is an example of unethical research. We believe, though, that "reasonable men" would agree that each raises disturbing questions.

All these studies have been published in reputable medical journals or professional proceedings since 1966. In all cases the research was done in the United States or the funding came from this country. Experimenters are not mentioned by name. Excluded from these cases are all those published before 1966 and those which have previously received public attention.

Grave Risks to Subjects

Experiment 1. Researchers in this experiment were seeking a way to evaluate anti-arrhythmic drugs. Epinephrine was injected in nine normal female patients to attempt to produce abnormal heart beat in order to test this new drug. In every case the production of an abnormal beat was repeated at least once. The researchers note that the production of arrhythmias experimentally had previously been avoided because of

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the belief that it was hazardous. They also tell the reader that although the procedure was explained to the subjects, they believe that "informed consent cannot be obtained for a study of this type." They claim that instead they "accepted the role of guarantor of the patient's rights and safety. . . ."

Experiment 2. In a second study researchers sought to study plasma renin levels in patients with both kidneys removed. Ten patients, who had had their kidneys removed as recently as two weeks prior to the experiment, were hospitalized for the eight-day period of the study. A few days prior to the beginning of the study they were transfused "in anticipation of blood loss due to repeated sampling." On the third day, "all subjects were clinically dehydrated. Serum samples were limited to the supine position since severe hypotension and near syncope rapidly developed in standing." On one day measurements were taken after standing quietly for two hours. According to the researchers, "to accomplish two hours of quiet standing, it was necessary to have most of the patients lean on a chest-high supporting table and to be frequently encouraged."

Experiment 3. The third study involved giving LSD to 24 subjects who had answered an advertisement for experimental subjects to be paid at a rate of $2 per hour. The purpose was to study the long-range "personality, attitude, value, interest, and performance change. . . ." Researchers claimed explicitly that no mention was made to subjects of possible personality or other changes, although 15 percent reportedly had never heard of LSD and another 73 percent had "only casual knowledge" of it.

Risks to Incompetent and Incarcerated Subjects

Research involving risks to incompetent subjects—children and mental patients—raises even more serious ethical difficulties.

Experiment 4. Nine children from 11½ to 16 years of age suffering from asthma were intentionally subjected to "challenge doses" of antigens known to produce asthmatic attacks in order to test the effectiveness of cromolyn sodium in blocking these attacks. The nine children were subjected to a total of 55 antigen challenges. Every child experienced at least one reaction described by the researcher as "severe." In addition, delayed asthmatic reactions 6 to 12 hours after the challenge were reported in five of the nine children. It is reported that these delayed reactions "tend to be followed by increased, and repeated asthma for a further day or two." Although seven of the nine children required regular bronchodilator medication, this was withheld for a period of 18 hours prior to the study.

Experiment 5. In another experiment 48 subjects ages 7 to 12 with findings confirming or suggesting the presence of hematologic disease were subjected to simultaneous dual-site bone marrow aspirations. Bone marrow samples were removed with an 18-gauge needle. The researchers point out that there are "physical and psychological problems in performing multiplesite, concomitant bone marrow aspirations in the pediatric patient.

Experiment 6. Similar ethical questions arise in research on mental patients and prisoners where the quality of consent, even if it is obtained, is questionable. At a maximum security facility for treating the criminally insane 90 male patients were "used in an exploratory study to determine the effectiveness of succinylcholine as an agent in behavior modification." This drug causes temporary muscle paralysis including inability to breathe. During the period when breathing is impossible, positive and negative suggestions are made to the subject which according to theories of psychological conditioning, are then associated with the experience. The experience in this case is apparently not physically painful, but the subjects describe the inability to breathe (which according to design lasts between 1.25 and 2 minutes) as a terrible, frightful experience akin to that of drowning. The criteria for selection of subjects for the study, according to the researchers, included "persistent physical or verbal violence, deviant sexual behavior, and lack of cooperation and involvement with the individual treatment program prescribed by the patient's ward team."

Experiment 7. Another experiment in operant conditioning was reported by an American psychiatrist working at a mental hospital in Viet Nam. He initiated a program in which 130 chronic male Vietnamese patients (mostly schizophrenics) were offered the chance to be discharged if they proved that they could work and support themselves. Only 10 volunteered to work. The remainder were told that if they were too sick to work, they needed treatment. The "treatment" was unmodified electroconvulsive shock. Whether from actual therapeutic effects of ECT or from the patients' fear and dislike of the treatments, a majority were working at the end of this phase. Next, the test was repeated in a group of 130 female patients, but after each had received 20 ECT treatments, only 15 of the women were working. At this point, all treatments were discontinued and men and women not working were told, "After this, if you don't work, you don't eat." Food was withheld for periods of up to three days at which time all patients were working. Upon their discharge from the hospital, the work provided for these former patients was tending crops for Green Berets in Vietcong territory "under the stress of potential or actual VC attack or ambush."

The Rights of Subjects in Research with a Placebo Group

There is one class of experiments for which, even today, there are no clear guidelines. A well-designed experiment often requires a placebo group for purposes of comparison.

Shocking as it may seem, no established principle of medical ethics requires that subjects be informed that one of the "risks" of an experimental procedure is that there is a control group included in the research design. Even the new and rigorous HEW guidelines do not mention this specifically. We see no reason why this should not be one of the minimal requirements of informed consent. Likewise, there is no clearly-established right to effective therapy for those in the control group.

Experiment 8. One such study was a 14-year prospective study of the value of hyposensitization therapy for children with bronchial asthma. Of 130 children still under observation at the time of their sixteenth birthday, 91 received in effective treatment for periods apparently lasting up to 14 years. This included a group who "received injections of buffered saline according to an elaborate "injection schedule." The authors point out that "No mother or child in the study knew that any sort of study was under way."

Responsibility for Harm to Subjects

Another principle which is not now recognized is that of the responsibility of the researcher, the researcher's institution, or the funding agency for harm done to subjects during the course of an experiment. Current DHEW guidelines do specify that the agreement, written or oral, entered into by the subject, should include no exculpatory language through

which the subject is made to waive, or to appear to waive, any of his legal rights, or to release the institution or its agents from liability for negligence.

They do not go on, however, to require that the subject be informed of an institutional obligation for harm done to subjects and do not even make clear that any such obligation exists. For research not done under HEW guidelines, no requirements vis-a-vis harm to subjects are established.

Experiment 9. Much of the research done on new contraceptives raises such questions. In one study, conducted in Latin America but funded by an American agency, 262 women had megestrol acetate capsules implanted in their forearms to test the long-term effectiveness of this drug as a contraceptive. The results were 48 unwanted pregnancies—six of them ectopic.

We have in our files published reports of hundreds of similar experimental pregnancies which raise the question of the researcher's obligation. We propose for consideration that as a matter of policy the funding agency or highest level of institutional sponsorship be clearly obligated for such consequences and that this be clearly made known to subjects of research during the consent procedure.

Experiment 10. Another study may not have involved physical harm to patients, but may well have subjected them to legal and psychological risks without their consent. Researchers at an open-ward voluntary psychiatric hospital were interested in the extent to which young patients were engaged in covert drug abuse. In 332 patients serial urine analyses were performed weekly for an average of 27 weeks "under the guise of a statistical survey of urinary creatinine." The researchers state that "the urine analytic data were kept completely secret from all other members of the staff, and at no time were the patients or staff aware that the urine samples were being monitored for abusable drugs." This research was supported in part by a grant from the National Institute of Mental Health.

The Pervasiveness of Human Experimentation

The highly publicized experiments involving human subjects may give the erroneous impression that such procedures raising ethical questions are rare and involve only bizarre procedures. A final study indicates that this is not the case.

Experiment 11. In this research, 41,119 patients enrolled in a major group health plan were given a test for pain tolerance as part of their regular checkup. The subjects were told it was a test for "pressure tolerance." Each subject placed his heel in a vise-like machine and was instructed to stand the pressure as long as he could. Researchers then compared age, sex, and racial differences in pain tolerance.

This is a relatively simple procedure. Similar simple tests are conducted in clinical settings, at times without formal review. In some cases experimenters may not even conceive of what they are doing as an experiment.

The problem, then, is one of developing mechanisms for consent and review which give greater assurance to the subject that his rights and interests will be protected. These experiments strongly suggest that the mechanisms now available are inadequate to the problem. The typical researcher may well be benevolently motivated and indeed do a good job of getting reasonably informed consent from his subject and protecting the subject's interests. That simply is not good enough, however. That experiments such as those described here can be performed and be published within the last few years means that we simply must intervene to guard the welfare of the citizens. We can no longer tolerate a situation in which a citizen, altruistically motivated to participate in research, may be subjected to grave and undisclosed risks.

The immediate establishment of a governmental committee to formulate rigorous procedures to insure reasonably informed consent and review is the minimum that is called for. This might well be one of the functions of the proposed National Advisory Commission on Health Science and Society. Even more effective would be a special committee with this as its sole task. The committee should include a substantial majority of individuals who are in no way associated with biomedical research.

The first priority of this committee ought to be the refinement of consent procedures discussed above including the requiring of information on: (1) the possibility of receiving placebos, (2) institutional responsibility for harm done, and (3) commitment to provide effective therapy to members of control groups. This committee ought to develop procedures requiring such informed consent from all subjects or their guardians—not simply those falling under HEW guidelines.

The committee also ought to develop new mechanisms for research review. One of the great problems of peer review as we know it today is that even when it is used in a serious way (which happens all too rarely), it is the peers of the researchers and not the peers of the subjects who are asked to evaluate the ethical acceptability of the proposed research. It is simply too much to ask individuals uniquely committed to the importance of medical research to judge the ethical acceptability of their colleagues' work in a disinterested manner. New and more public mechanisms are needed to assure subjects that their ethical and legal rights will not be violated by the minority of researchers who are misguided or irresponsible in their judgment of a person's welfare.

Dilemma 3 — TRYING OUT NEW DRUGS: WOULD YOU VOLUNTEER?

Dr. Nancy Lee was attempting to develop a faster and less painful way of treating rabies. To determine the effectiveness of the new rabies treatment, she enlisted the assistance of several prisoners. All of the prisoners were on "death row" awaiting execution for various serious crimes. The prisoners were told that if they agreed to participate in the drug testing program their death sentences would be reduced to life imprisonment.

Ten prisoners agreed to participate in the rabies treatment experiment. The subjects were divided into two groups of five subjects each. All ten of the subjects were then injected and infected with rabies. One group of subjects was administered the new rabies treatment, which is a long, painful and often dangerous procedure. The results of this experiment indicated that the new treatment was far superior to the conventional treatment.

One major problem arose during the experiment. One convict who participated in the experiment has an unforeseen brain disorder which was aggravated either by the rabies injection or the treatment. This prisoner died soon after the experiment.

Should Dr. Lee be held accountable for the prisoner's death and be brought to trial for murder? Why or why not?

SAMPLE OPINIONS

George

"No, I don't think Dr. Lee should be punished. After all, the prisoner was going to die anyway, and he took his chances. Besides, the experiment was evidently approved by the judge or the people in charge of the prison. No one guaranteed that the experiment would be a success. If one could guarantee the success of the experiment, there would be no need to actually do the experiment! On the other hand, the prisoners knew what they were getting into. They probably wanted to do some good for society . . . almost like making some kind of repayment for their past ways. What greater good could a condemned prisoner do for society. Anyway, I'm sure that Dr. Lee didn't want the prisoner to die. It just happened!"

Larry

"No, I don't think that Dr. Lee should be charged with murder. Actually, it is very important for society in general to have a safe and more effective rabies treatment. Every year many people die needlessly because there is no effective way of treating rabies. In this case, Dr. Lee was well within the law in performing the experiment. She had the permission of the authorities, and the consent of the convicts. If Dr. Lee is guilty, so are several other people, including the judge and the warden—even the dead convict himself. Drugs can't be tested just on mice. Before they can be used on human subjects or be made available for general use, someone has to try them first. Dr. Lee should only be punished if she had intentionally sought to do harm. Even the law recognizes that."

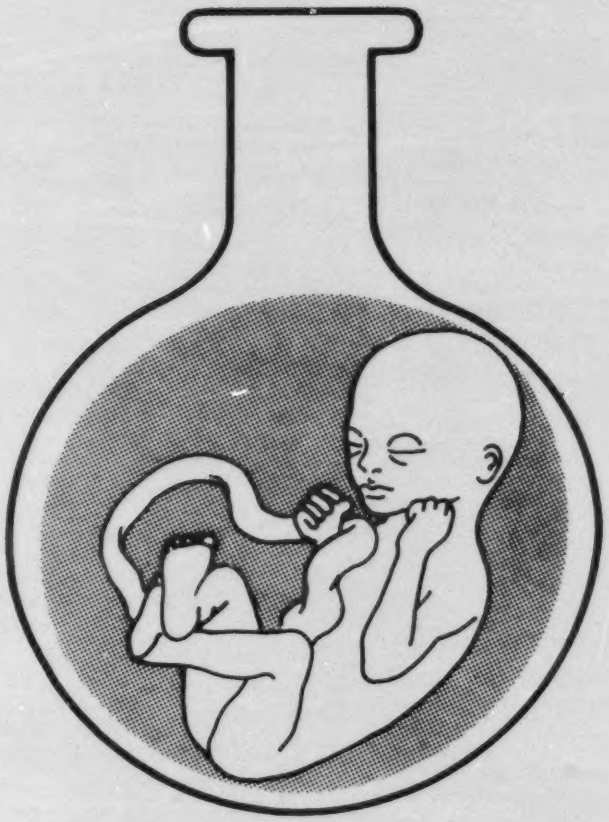
June

"Yes, Dr. Lee should be most certainly punished for taking advantage of the prisoner. Because those men were prisoners—even on "death row"—does not mean that they don't have any rights or their welfare is not protected. Not only did Dr. Lee violate the rights of the prisoners when she conducted the experiment, but I'm also sure that in reality the prisoners probably had no choice except to agree to participate. A prisoner sentenced to death would jump at any opportunity to escape execution.

All human life is important—even that of a condemned killer on "death row." In this case, Dr. Lee took that life—even though she was attempting to do good. I think that even a condemned prisoner has the right to live out his remaining days."

DISCUSSION QUESTIONS

- Would your decision be any different if the subject were not prisoners? Why or why not?
- If you were the warden of the prison, would you permit the research study to take place? Why or why not?
- Given that the convicted prisoners were to be executed, did they really have a free choice? What does "valid informed consent" mean to you? Why?
- Is it right to ask those who have violated society to redeem themselves by doing a good deed? Since new drugs and medical treatments have so many unknown side effects and possible dangers, should they first be tested on prisoners before they are tried out on the general public? Why or why not?
- If you were in the prisoner's place, what would motivate you to volunteer for an experiment? Why?
- Should researchers be held responsible for unpredicted damaging effects of their experiments? Why or why not?
- In many instances, knowledge of the type of experimentation to be performed would prevent subjects from volunteering for experiments. How should researchers conduct important experiments if this were the case? Why?
- Some research studies such as drug testing require a control group who receives no treatment in order to prove the effectiveness of a drug, and those control subjects often suffer irreparable effects as a result. How does one reconcile the need to gain information and still protect subjects?
- Should the same guidelines for conducting experiments on human subjects apply also to animal subjects? Why or why not?



Fetal Research

Reading 1

The Ethics of Fetal Research[1]

by Paul Ramsey

We who are not scientists can begin to understand the nature and purposes of experiments using live human fetuses by classifying what is done or may be done into three sorts or types of research. In one type, the human research subject is the fetus in utero (most frequently, in anticipation of abortion). In another type, the subject is the still-living, previable abortus, the product of spontaneous or induced abortion, after it is disconnected from the placenta. A third type falls temporally between these two: in cases of abortion by hysterotomy (a procedure which emulates a Caesarian section), the fetus may be exteriorized, leaving its placenta in place, and then experiments may be conducted while it is still connected with the mother—before the umbilical cord is cut.

Examples of the sorts of research that can be done using the live human fetus at these times will fill in that sketch. In the last-mentioned case, for example, while the fetus is still connected with the mother, tests can be performed to determine whether a substance or substances pass from maternal circulation across the placental barrier into fetal circulation. This might be done by injecting a substance into the woman and at five minute intervals taking samples of fetal blood. Fetal organs subsequently can be tested to determine whether the substance has lodged in them. Or a series of injections could be begun shortly before hysterotomy, continued while the procedure was being performed, and completed with the fetus exteriorized and still linked with the placenta.

Research using the still-living, previable abortus, separated from its mother, is usually directed toward developing improved ways of saving immature fetuses, or improving incubators for immature and premature neonates or infants. The goal is to save future human lives. Such attempted "salvage" or "rescue" techniques are the perfusion incubator and submergence in saline solution under hyperbaric pressure. In the first case a vein and an artery are cannulated, and the fetal blood is thus externally oxygenated and then circu-

[1]This selection is excerpted from *The Ethics of Fetal Research* by Paul Ramsey by permission from the Yale University Press, New Haven, Connecticut, 1975.

lated. In the second case, the goal is to force oxygen through the skin. In both cases, the life of the previable abortus is experimentally extended, in the hope of learning how to save future babies until their lungs can expand and function. I suppose, also, that useful information might be derived from procedures that would of themselves directly kill or hasten the abortus' dying.

Research on the fetus in utero may consist of tests to determine whether given substances pass the placental barrier and harm the fetus; they may try to determine which are most efficient in giving aid and protection to the fetus. An example of the latter is the experiment to determine which of two antibiotics should be used instead of penicillin to treat in utero syphilis in the fetuses of women with penicillin allergies. An example of the former can be construed by imagining that thalidomide has been tested before it was allowed to be prescribed and marketed. Thalidomide, I understand, is quite a good drug for its purposes. However, it had tragic consequences for the children of women who used it in early pregnancy. These are some of the benefits to come and deteriments to prevent by knowledge gained by experiments on the human fetus in situ, in anticipation of abortion. . .

Experimentation on the fetus in utero, however, is by no means limited to drug studies. Ultrasound is or can soon be used in the early detection of fetal heart defects; such diagnosis can be important for treatment at birth. Physicians do not believe that the use of ultrasound is really damaging to the fetus. They would simply like to use the fetus in utero in anticipation of abortion to "prove" that this is the case, before bringing the diagnostic procedure into general use. Similarly, one of the researchers in the antibiotic experiment is quoted as saying, "There was no reason to think that either antibiotic would be harmful to a fetus—each is widely used—but it seemed wrong to take any chance."

Reading 2

The Cost of Fetal Research: Ethical Considerations[1]

by Hans O. Tiffel

Abortion produces the fetuses for fetal research. And, since abortion discord continues to occupy wide public attention, it overshadows, prejudges, and even tends to absorb fetal research as an ethical issue in its own right. I shall not explicitly discuss the morality of abortion here but shall argue that whether in general one approves of abortion or disapproves, nontherapetuic and possibly harmful experimentation with living fetuses is immoral in general and especially for abortion fetuses.

To be clear about terms, "nontherapeutic research" refers to "research not designed to improve the health condition of the research subject by prophylactic, diagnostic or treatment methods." "Fetus," following the Commission's definition, is a label that applies as early as the time of implantation. And "abortion fetus" refers to the living human fetus before, during, or after abortion. "Harm" is used in an all-inclusive sense, whether minimal or severe, potential or actual, and whether or not it involves pain. Such a wide definition forestalls the possibility that all conceivable procedures with abortion festuses might be justified with the label of "minimal harm" since it is restricted to the relatively short time before the fetus dies.

The three most important aspects of the controversy are the status of the fetus, the question of consent, and the relations between means and ends. . .

If the fetus is merely a "collection of cells" or "live human material," it does not qualify as a human subject. In this perspective, the aborted human fetus can be compared "to an excretion that may be put to any use not offending against public decency." It follows that experimentation with living fetuses would not raise the sorts of legal or ethical questions that are appropriate for research on human beings. And indeed, if the fetus may not properly be called "one of us," a fetal human being, or some similar term that includes it in the community and care of man, the whole controversy is much ado about nothing. Ethically speaking, problems about the fetus would be resolved much as are problems with human

[1]This selection is excerpted by permission from *The New England Journal of Medicine*, Volume 294, pp. 85-90, 1976.

ova, the uterus, or the appendix, not just in regard to their removal but also in reference to experimentation before or after their removal.

To my knowledge there is no way of proving the humanity of the human fetus. Empirical evidence such as pictures of the embryo and previable fetus or descriptions of its early organic development are not decisive. Amazement over how much it is already "one of us" runs against the skeptical awareness of how far it has yet to go. Biologic facts are not decisive in disagreements over who is a human being.

The great urgency of therapeutic fetal research implies the humanity of the fetus to the extent that help for the fetus is help for human beings. A fetus in utero saved through research is the equivalent of the medical rescue of a human being. And fetal experimentation not only saves human lives but prevents human illness and suffering and offers hope to seriously ill patients. The promise of this research is clearly for humanity, born and unborn. Indeed, the question of whether the fetus is a human being never even arises when we are speaking of the actual or potential benefits of such research or when this new life is wanted by its parents. Of course it is a human being. And parents are not averse to naming it and to relating to it in personal ways. Doubts about the humanity of the fetus tend to appear only on the risk or cost side of such experiments and when fetuses are not wanted. The unavoidable cost of fetal research is less if it is something else than human beings that are placed at risk. But if the humanity of the fetus is assumed in the importance ascribed to fetal research and in welcome pregnancies, we may not logically evade that status in weighing the cost of experimentation. The relativistic argument that makes the value and the rights of human fetuses dependent upon context, upon being valued or wanted by individuals or society, reduces human fetuses to the status of animals or property and not only would treat fetuses unequally (wanted vs. unwanted) but would make the value of human life dependent upon inconstant personal and social preferences.

Proponents of nontherapeutic and possibly harmful experimentation with abortion fetuses insist that we should exempt unborn offspring carried to term—those who later in life might be plagued by unforeseen harm. It would be better to protect wanted human lives from dangers that could be borne by fetuses that have no future, fetuses that are dying by the thousands since the Supreme Court decision on abortion. The law and our practice already declare that these lives are expendable. So why not expend them in th good cause of scientific progress and the future saving of sick children? In fact, it may be unethical not to do fetal experimentation "when the research has as its objective the saving of the lives (or the reduction of defects) of other, wanted fetuses."

If, in contrast, one holds that all human life is important regardless of its utility and that even unwanted and uncared-for human beings are of intrinsic worth, one will have difficulty in agreeing to a strict division that grants all benefits to wanted fetuses and places the costs upon the unwanted.

Reading 3

The Human Fetus As Useful Research Material

by Robert S. Morison, M.D. and Sumner B. Twiss, Jr.

Case No. 138

The—government's Committee on Biological Research Review examines all research proposals submitted for funding by government grants and contracts. This day's meeting was devoted to examining one specific proposal. It came from the world famous Institute of Embryology at the country's most prestigious university teaching hospital. No one on the Biological Research Review Committee doubted the scientific merit of the proposed research or the ability of the research team who would jointly undertake this major study. Their doubts were fundamentally ethical.

The Institute of Embryology had long been concerned with the plight of women who were prone to spontaneous abortions. They had pioneered in the development of acute care facilities for premature newborns. Now they were eager to develop techniques which would permit the salvaging of pre-viable and marginally-viable fetuses in the 300 to 1200 gram range. The research proposed for review and funding was for the development of an artificial placenta. Fetuses would be obtained from those aborted voluntarily by hysterotomy under the country's uniform abortion statute which permits abortion up to the 24th week of gestation. They would be transferred to the Institute's research facilities. The technique would involve cannulation of the internal iliac vessels offering total perfusion of the fetus/infant. It was recognized that success would be limited for the early stages of the research. The research team anticipated maintenance of vital signs for periods of no more than minutes or hours. It was hoped, however, that especially with fetuses in the 1000 gram range, survival time would increase gradually as the technique was perfected. It was decided for the purposes of this phase of the research that during the critical period of transfer of the fetus to the artificial placenta no fetus would be maintained for more than a two-week period because of possible damage. Fetuses would be obtained from the obstet-

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rical services of six hospital in the immediate vicinity. Adequate compensation would be made to the hospitals to cover expenses including supplies and staff time necessary for maintenance of the fetus prior to the time it was delivered to the embryology clinic.

by ROBERT S. MORRISON, M.D.

The Committee should have no particular ethical difficulty with the proposal. In the first place, it may be viewed simply as an extension to an earlier stage of the work already successfully accomplished on prematurely born infants. There is, of course, one significant difference. In the earlier cases, the parents of the experimental subjects usually hoped for their survival. In the present proposal, the experimental subjects would be fetuses whose prospective parents will have specifically renounced the responsibility of parenthood.

How does this alter the ethical situation? As a first approximation, it would appear to simplify, rather than complicate it since the prior decision to allow an abortion would, in almost all instances, have been based on a prior finding that the right to life of the fetus was outweighed by other considerations. Any further threat implied by the proposed experimental procedure would appear to be trivial in comparison.

Those who follow the thinking of the Supreme Court may also point out that, if a nonviable fetus has not yet reached the compelling point for protection against a clear threat to its life, there should be much less hesitation about exposing it to the minor inconvenience of the proposed experimental procedure.

Those who are nevertheless driven to recognize the fetus as a person would ordinarily base the decision to abort on some weighing of the rights of mother and fetus. In such cases, as long as the fetus survives, it would appear to have the status of a minor child. The matter might then be handled by asking the parents' permission for the experimental procedure in the usual way. Alternatively, in order to avoid ambiguities, such cases might simply be omitted from the series. Once these theoretical matters are out of the way, it may be pointed out in supplemental defense of the proposed experiments that they seem to conform with the principles set down in Nuremberg and Helsinki. The probable harm to the fetus is clearly outweighed by the enormous gain to future generations of parents who may have tried repeatedly to bear a living infant, only to have their hopes dashed by spontaneous abortion. It is clearly stipulated that the auspices under which the research is to be carried out are of the first class, and the experimental design leaves nothing to be desired.

A new and serious problem will, of course, arise as the experiments approach success. The proposal recognizes this in providing for the termination of an experiment on any given fetus prior to the period of normal viability. It would clearly be unethical to employ extraordinary means actually to bring into the world of the living an infant whose parents had already rejected it. In other words, as soon as the experiments give promise of imminent success, they should be limited to those spontaneously aborted fetuses that the parents wish to bring to maturity.

Enthusiastic advocates of abortion might oppose the proposed experiment on the grounds that, by pushing back the moment of viability, the development of a successful treatment would progressively shorten the period during which abortions may be regarded as permissible. I find it simply offensive to oppose the experiments on these grounds. Instead, one may be allowed to hope that in countries advanced enough to provide successful treatment for early stages of prematurity the people would be sophisticated enough to have their ordinary abortions before the fourth month.

by SUMNER B. TWISS, JR.

I shall contend that the research proposal as stated raises far too many objections to be appraised as morally justifiable. In order to elucidate some of the significant moral issues I will examine three aspects of the research proposal: 1) the background of the research design, 2) the design of the proposed research, and 3) the objectives of the research proposal.

1) Background of the Research Design

According to a growing consensus on canons regulating medical experimentation, it is necessary to engage in what has been called "the animal work" before going on to engage in "the human work." Since the research proposal omits all reference to this stage of research and talks only about developing an artificial placenta by experimenting on human fetuses exclusively, I must assume that it contravenes this rule of medical experimentation, whether by negligence or deliberate intent I do not know.

2) Design of the Proposed Research

The research, as proposed, raises at least three areas of moral concern: the consent of the research subject, the disposal of the fetuses, and the dilemmatic situation produced by successful completion of the research.

• *Consent:* The question of who, if anyone, should consent to the proposed experimentation is difficult to answer. Is it the woman who voluntarily aborts the fetus? Or is it the fetus itself? It should be noted that the proposed medical intervention at least indirectly interferes with the presumed desires and decisions of women to have their fetuses killed. Although the decision to have an abortion may be construed as a disavowal of any responsibility for the fetus after abortion, the practice of abortion seems to presuppose fulfillment of the decision for feticide. Because of the proposed medical interference with this decision, the women's informed consent for the short-term maintenance and experimental use of their fetuses should be obtained. The women may well be construed as experimental research subjects undergoing a medical procedure for the sake of medical research.

However, the issue of consent of medical experimentation does not end here. While informed consent would relieve the researchers from the allegation of illicitly manipulating the desires of unsuspecting and unconsenting human research subjects, obtaining this consent may not release them from the charge of complicity in the women's willingness to be presumptuous with their fetuses. It can be argued that the fetuses are research subjects—not volunteers. To construe the fetuses' informed consent to the proposed research, to consent on their behalf that they be exposed to the risks of experimentation would not be so much absurd as manifestly immoral. Considering the hypothetical case of bringing such a fetus to term as a person possibly suffering deleterious consequences of those experimental risks may help to elucidate the point and logic behind my objection here. I contend that by the canons of medical experimentation, the researchers cannot give such proxy consent for the fetuses as research subjects. The logic behind this particular objection for denying the legitimacy of proxy consent does not presuppose or imply the position that the fetus is a human person before being brought to term, although it does argue that the fetus should be regarded as a research subject, particularly when the

possibility of longer periods of fetal experimentation is taken into account.

• *Disposing of fetuses:* The matter of disposing of the fetuses after short-term maintenance and experimentation raises some difficult issues. On the view that distinctly human life begins at some time before disposal, the research proposal is obviously vulnerable to the charge that it incorporates an inherently immoral practice. Since the fetuses persumably may be obtained up to the 24th week of pregnancy, a two week experiment would permit life maintenance up to as late as 26 weeks, beyond the time abortion is permitted in the country, and very late for denying distinctly human life.

I would like, however, to probe the practice of disposal more subtly, suggesting problems which may arise regardless of whether the fetus is viewed as human life. Disposal is justified by the research proposal on the grounds that experimentation may cause fetal damage so deleterious that in the judgment of the researchers the fetus ought not to be maintained for more than a short period of time, much less be brought to term. Regardless of whether the fetus is human life it is a research subject who did not consent to the possibly damaging experimentation performed upon it. So, by means of the practice of disposal, it may appear that the researchers are trying to rectify one moral wrong by performing another.

• *Moral Risks with Success:* As gradually improving techniques permit fetal growth to later and more mature stages, then the issue of disposal will be met head-on in the form of the following presently unresolved questions: When do fetuses acquire the status of protectable humanity? When they can be brought to term possibly without damage, what will be the grounds for disposal then? Will the original abortive decisions of their biological mothers be invoked to justify disposal, or should the fetuses be viewed as coming under the aegis of "protectable humanity"? If brought to term, will they finally be admitted into the human community or will they still be considered material appropriate for further experimentation? Who will take responsibility for their personal and social nuture?

Careful consideration of the later phases of the research design raises the broad question of whether the researchers can ever morally get to know how to perfect the artificial placenta. One view argues that unless the possibility of fetal damage caused by the experimental techniques can be definitely excluded, the research, when viewed in its later phases, is immoral. A second view is that the researchers should be expected only to assess whether the risks accruing from the use of the artificial placenta are at an acceptable level, e.g., roughly equivalent to the risks of a natural pregnancy and birth. In the final analysis any decision must consider the objectives, and not only the internal design, of the research proposal. If the goals of the research are therapeutic, then the second position may seem more plausible. While if the goals are demonstrably non-therapeutic, particularly for the fetuses being experimented upon, then the first position may pose a conclusive objection.

3) Objectives of the Research Proposal

The stated objective of the research proposal is to aid the plight of those women prone to spontaneous abortion. On the face of it, this counts as a therapeutic objective. Some would maintain that an important line must be drawn between remedial therapy for a medical condition, on the one hand, and "doctoring" or satisfying desires by biomedical technology, on the other. And they would conclude that medical practice and research should be devoted to the former only. Others would consider acute psychological suffering to justify therapy. I think that the present situation is ambiguous enough that the objective of the research proposal may be legitimately construed as therapeutic, and even if this contention is misguided the beneficiaries of the perfected artificial placenta will include the spontaneously aborted fetuses.

Can the researchers morally get to know how to perfect the artificial placenta under the proposed research design? I contend that the experimental design of the research proposal is, on the whole, not morally justifiable, despite its praiseworthy therapeutic goals. It does not propose to experiment for therapeutic purposes directly on spontaneously aborted fetuses; rather it proposes to submit other voluntarily aborted fetuses to hazardous procedures not therapeutic for them.

However, I think that research along these lines should be encouraged and could be redesigned so as to avoid many, if not all, of my objections. Here are just a few suggestions: 1) do all the necessary "animal work" first; 2) obtain fetuses only from those women who spontaneously abort them and are willing to consent to "therapeutic experimentation"; 3) develop a discriminate disposal policy based on the welfare of the fetuses being therapeutically experimented upon; 4) hue to all the relevant canons for medical experimentation; etc. With these and similar modifications, I suspect that a good (moral) case could be argued for researching and developing an artificial placenta. It is most unfortunate that the world famous Institute of Embryology was so short-sighted. With careful planning it would have saved itself (and me) a lot of trouble. As things stand now, it may have lost some of its prestige.

Dilemma 4 — RESEARCH ON THE FETUS: SHOULD WE OR SHOULDN'T WE?

Robert Saunders, a medical researcher at a major research hospital, is working on the development of an artifical placenta. The artifical placenta would simulate the natural blood circulating environment for nutrients and oxygen exchange to promote development of the fetus to the stage of a full-term newborn. Success of this method to sustain premature fetuses would be a major medical breakthrough since it would provide a rescue technique for fetuses of women who are prone to premature deliveries.

In these early trials of the experiment fetuses under 24 weeks of gestation are employed. Under 24 weeks fetuses are considered previable (i.e., they have no chance of survival outside the mother's womb). The longest survival time of these experiments has been 11 days. However, the guidelines governing this type of experiment indicate that the experiment must be discontinued after two weeks. To continue the experiment longer would increase the possibility of the fetus to survive. If the fetus lives, one cannot be sure that it will develop into a normal child. It is not known what effects the experimental procedures may have had on the fetus. Furthermore, it creates the problem of bringing a person into existence against the wishes of the parents.

Saunders has successfully maintained a 24-week old fetus for two weeks. He feels that since he is so close to perfecting the technique and since the fetus has a good chance of survival, he wants to continue the experiment—even though he will be violating the guidelines which limit the experiment to two weeks.

Should he continue the experiment? Why or why not?

SAMPLE OPINIONS

Jeffrey

"He should not continue the experiment. This is too new an experimental technique and there are too many unknowns. Besides, guidelines were written for the purpose of preventing people from going too far. It also seems that the possibility of being born with defects or something wrong is too great. Besides, what if the fetus lived and wasn't normal—how would that affect the parents and the child? I think it would be best to put it out of its misery and eliminate the possibility of something being wrong. If I were the fetus, I would certainly not want to lead a life that's not normal.

Whoever gave permission for the experiment must have understood that the technique hadn't been perfected. They probably had no intention for the fetus to survive, knowing the risks of possible damage. The researcher must go by the wishes of the parents."

Marcy

"He should not continue the experiment. When Saunders took on the experiment he, in essence, agreed to the conditions regulating the research. How can he then take it upon himself to change the guidelines at this time? Medical researchers in all areas must work within the rules set down, otherwise, illegal experiments would abound. This will cast doubts on the integrity of the field and produce possibly dangerous types of research. The panel who reviewed and approved the research proposal had carefully weighed the possible considerations and came to the most reasonable solution; therefore, it is not up to Saunders to question the consensus of the group.

Saunders must further recognize that any experimental procedure carries the grave risk of harmful effects. If the fetus is maintained to full term with the fullest possibility of suffering from abnormality, what then is Saunders' responsibility to society? Can he justify burdening society with a not fully functioning individual?

The intent of the experiment was to develop a technique to increase the survival probability of more mature fetuses who are at a stage of normal viability, not the fetuses used in these experiments who are below the previable stage."

Linda

"Saunders should continue the experiment. One cannot arbitrarily designate one stage of fetal development as more human than another—that is, that fetuses under 24 weeks are mere experimental objects and those beyond that carry the status of humaness. The fact that the fetus in question shows vital signs indicates that it is living and should be guaranteed the right to life. Because one has exposed it to an experimental procedure does not mean that it has given up its claim to life.

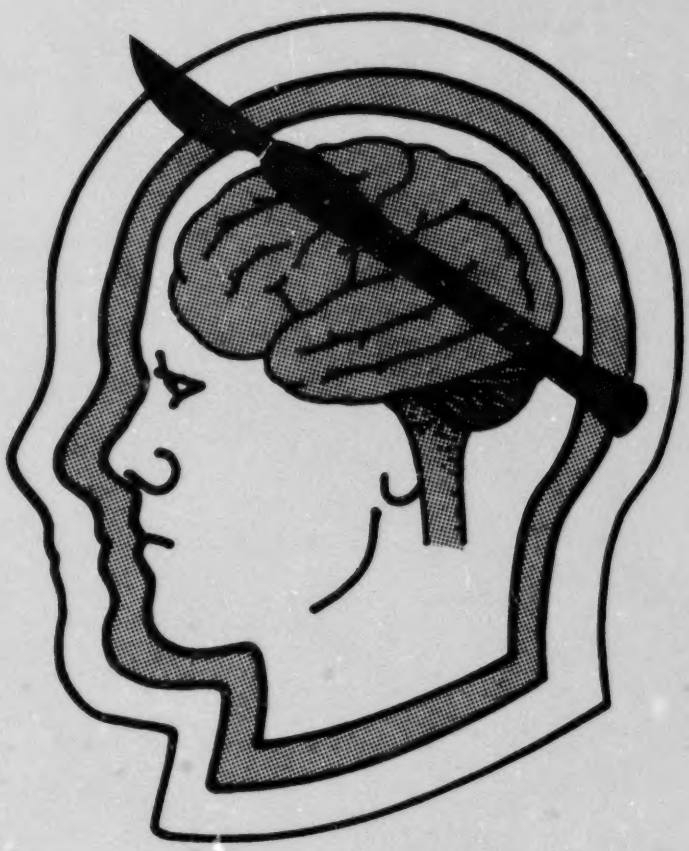
There is also the question as to who has the right to give permission to expose the fetus to the experiment. Are the parents justified in allowing the fetus to be a research subject? How can the rights of the fetus be protected?

I think that any experimental techniques performed on a human subject is wrong if there is no intent to benefit the subject. Most of all, the welfare of the subject should be the first consideration rather than the knowledge gained to benefit others.

In this case, the guidelines clearly did not focus on the rights and the welfare of the fetus."

DISCUSSION QUESTIONS

- Why should it be important for a researcher to follow the guidelines set forth by the review committee?
- What obligations should researchers conducting fetal research have to the fetus? To the parents? Why?
- Should research be conducted if the subject does not benefit from it? Why or why not?
- Should parents have the right to give consent to experimentation on fetuses? Why or why not?
- From the point of view of the benefits derived from the new techniques, are there risks that should be permissible? Why or why not?
- Who should be responsible for the care of the child if it lives? Why? If an abnormality shows up later on in the child's life, can anyone be blamed? Why?
- If you were the fetus, what would you want done? Why?
- What if the parents changed their minds and decided they wanted the fetus to survive—should the experiment be continued? Why or why not?
- If the fetus becomes grossly abnormal at a later time, what should the researcher do? Why? Is it any worse to dispose of the fetus at a later time? Why or why not?
- If the researcher agrees to terminate the experiment three weeks later, should he then be allowed to continue? Why or why not?



Human Behavior Control

Reading

Psychosurgery: The New Russian Roulette

by Lori Andrews

The postcard arrived a year ago. It showed the photo of a family friend, her head shaved and marked for scalpel. "Will try psychosurgery. I'll go in Sandra, come out Jenny. Maybe then I'll get custody of the kids."

We called the hospital following the surgery, but neither the old Sandra nor the new Jenny remembered us. Instead of reuniting her with her children, the operation triggered violence and delusions. An involuntary commitment followed.

Not all psychosurgery ends tragically. Patients suffering from intractable pain or certain obsessive-compulsive fixations seem to be benefited by the procedure. But it is a drastic and inappropriate treatment for people who are merely depressed or dissatisfied. And to date little in the way of either public awareness or state or national laws protects them from the modern psychosurgeon who, like his Peruvian counterpart 12,000 years ago, offers to open their skulls to release the demons.

"Psychosurgery involves the destruction of those parts of the brain—such as the center for aggression or sexuality—which the surgeon feels are responsible for the patient's abnormality," explains one psychosurgeon. This may be done in several ways. The skull can be opened and the brain tissue destroyed with a blunt, tongue-depressor-style instrument. Or electrodes can be implanted to carry current that burns the target area. Unlike other brain surgery, which seeks to mend visible tears and cut away growths from the brain tissue, psychosurgery is performed even if the organ looks perfectly normal.

The rationale behind psychosurgery is not entirely convincing. The brain is too complex to have a single center for a given drive. So psychosurgeons use a road map of the brain to choose a dozen or more target sites for each operation. One wrong turn and the patient experiences the loss of a possibly valuable part of his personality.

"Psychosurgery is like doing surgery with your eyes closed," says brain researcher Eric Schwartz, an assistant

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professor at New York Medical College. "We don't have a basic understanding of the brain to support it."

Despite reservations even within the medical profession, psychiatrists still refer patients to the 200 neurosurgeons who perform psychosurgery. At least 500 to 600 operations are performed annually. But since there is no required reporting procedure, the actual number may be much higher. Boston is the psychosurgery capital of the United States. People can shuttle into the city to rid themselves of unwanted aspects of their personalities as women once flew into New York to rid themselves of unwanted fetuses. Yet the existing studies on the value of psychosurgery are in conflict. Most research is done on mental patients; success is measured in terms of patient "manageability" rather than cure.

Even in the successful cases, the operation blunts the person's emotions and causes memory loss. In that sense, psychosurgery is only a milder version of those highly suspect lobotomies which were performed on over 50,000 patients in the 1930s and 1940s. But psychosurgery is potentially more dangerous, since it has been prescribed for everything from hyperactivity in children to obesity and chronic marijuana-smoking. In Philadelphia, the press uncovered a doctor operating on drug addicts. A southern neurosurgeon specializes in alcoholics. Foes of the procedure see it as a means of social control, claiming that the usual targets are societal black sheep: political dissenters and captive populations.

Psychiatrist Frank Ervin and neurosurgeons Vernon Mark and William Sweet have proposed psychosurgery as a "cost-effective" way to combat urban violence. As far back as 1967, in a letter to the Journal of the American Medical Association, they proposed "intensive research and clinical studies of the individuals committing the violence. The goal of such studies would be to pinpoint, diagnose, and treat those people with low violence thresholds before they contribute to further tragedies." But "potential violence," like mental illness itself, may be in the eyes of the beholder. And in a culture which only recently began repealing statutes that allowed involuntary commitment of people for "social nonconformance," the idea of enforcing values through an irreversible operation is questionable at best. Amid scandals involving its use on Soviet dissidents, Russia banned the procedure. In America the operation is still available because of the value we place on autonomy—the American paradox—the idea that a free society should allow people to choose as well as to refuse psychosurgery.

For some people there is no choice. Psychosurgery may be proposed to inmates of mental institutions and prisons without an adequate explanation of its risks. And its performance may be subtly or not-so-subtly coerced by promising the patient release if he consents —or by warning him that the operation represents his last chance to lead a normal life. In 1973, in Michigan, the first court to consider psychosurgery for a mental patient heard the patient testify that the extra attention he'd received convinced him to consent. The Boston State Hospital Human Rights Committee defends experimentation on patients: "The patients get extra care from the study personnel, and their physical condition is checked more frequently than might be done otherwise."

Dr. M. Hunter Brown, a California neurosurgeon, sees psychosurgery as an appropriate treatment for violence. He has volunteered his services to the California prisons to test his theory. Brown notes that it costs $100,000 to jail a convicted murderer while for $6,000 he can be operated on and, in Brown's rosy view, returned to society.

Mass murderer Edmund Kemper is an inmate at the Correctional Medical Facility in Vacaville, California. He claims that he wants psychosurgery but that California laws make it unduly difficult for him to obtain it. At a recent court appearance, he avowed fervently that he was not requesting psychosurgery for the promise of release but because surgery would improve his life. It is interesting that this is the same claim that was made by an involuntarily confined Michigan mental patient. But when the patient's attorney got him released from the institution on the ground that his confinement was unconstitutional, the first thing the patient did was withdraw his consent to the surgery.

A mass murderer in New York would not have Kemper's problem obtaining psychosurgery. No New York law prevents its use on prisoners. An inmate may not be taken out of a prison for medical surgery without the authorization of a judge, but Section 148 of the New York Corrections Law provides for the establishment of psychiatric clinics within prisons. Psychosurgery could take place in one of these clinics with no outside scrutiny of whether the inmate really needed the surgery or even consented to it.

The possibility of psychosurgery's use as a means of social control prompted Congressman Louis Stokes, a black Democrat from Ohio, to introduce a bill which would ban psychosurgery entirely. "When you get to screening segments of the population for the purpose of ascertaining whether they are violence-prone, and whether they may conduct riots, and whether they may have damaged brains, and so forth, what you're talking about is a process by which you control society," says Stokes. "And who are they talking about? They're talking about black people and poor people. They're not talking about examining the minds of these kids who go to Florida every year at Christmastime and tear up a whole damn town. They're talking about going to Detroit, Chicago, Watts, Cleveland, and examining their brains, because if you riot, there must be something wrong with your brain."

Just as there is no federal law to limit the use of psychosurgery as a means of social control, there is no law to govern its implementation as a proposed therapy. The extensive psychosurgery regulations of the Department of Health, Education, and Welfare do not apply to any of the operations currently being performed, since none of them involves HEW funds. In the area of state legislation, Alaska, California, Connecticut, Florida, Idaho, Illinois, Massachusetts, New York, North Carolina, Oregon, South Dakota, Tennessee, and Vermont grant mental patients the right to refuse psychosurgery.

The New York law seems liberal on its face, stating that the mental hospital "shall require consent for surgery," but this requirement is "subject to the regulations of the Commissioner of the Department of Mental Hygiene." This allows the department to make or revise its regulations without subjecting the rules to the public scrutiny given to state statutes. Department regulations are also changed more easily than laws and often reflect political biases rather than public consensus.

The right to refuse psychosurgery could therefore be undermined by a New York Department of Mental Hygiene regulation that allow the patient's spouse, parents, or adult child to authorize psychosurgery if the patient is not competent. In an emergency, the director of the institution can authorize the procedure.

Similar provisions have been used in other states to undermine what appears to be a broad guarantee of a right to

refuse psychosurgery. Particularly disturbing is the emergency exception. In its brief in a recently filed case, the Massachusetts Psychiatric Association claims: "Certain patients are in a chronic emergency state," including some who "are so sensitive to stimuli that one must constantly be alert for developing signs of violent outburst." Psychiatrists have also attempted to invoke the "emergency" exception, based on the shortage of staff, not on the patient's critical needs.

Most court cases, like the New York Department of Mental Hygiene regulation, uphold the patient's right to refuse only if the patient is "competent." But a psychiatrist can claim that a patient's refusal to undergo psychosurgery is itself evidence of incompetence, illustrating the prevailing tendency of mental health professionals to "look beyond" what the person is actually saying. "We have a tendency to 'embrace' the mentally ill," says a professor at Yale Law School. It matters not that the grip may be vicelike and debilitating.

But times are changing. Rosalynn Carter claims that she plans to make mental health her primary area of concern. Last April, a California court held that psychosurgery is so harmful and intrusive that it is not to be performed on mental patients until a heaing is held to determine the voluntariness and competency of their consent. Neither the patient's refusal nor his institutionalization may be taken as a sign of incompetence. Although the court assured that a competent California patient's refusal to undergo psychosurgery may not be overridden, it left open the question of who may consent for an incompetent patient. Substitute decisionmakers such as relatives, medical personnel, or review committees all suffer from conflicts of interest.

According to Professor Harold Edgar of Columbia University, "It is quite possible that some families would be willing to consent to almost anything to get a troublesome relative off their hands." The cochairwoman of the National Organization of Women's mentalhealth task force told California legislators that her psychiatrist was so keen for her to have shock treatment that he was "at the heels" of her husband. She got a divorce in order to escape the unwanted shocks.

Decisions made by some medical personnel are also suspect. A doctor doing research is in need of subjects and is thinking about his experiment in addition to the patient's best interest when he is considering a case. Moreover, when a staff shortage exists, psychosurgery may be misused in order to make patients manageable. According to Professor Michael Shapiro of the University of Southern California Law School, "Even if the diagnosis of mental illness were assumed to be value-free, the determination of what to do about it is not. To rely solely on medical experts involved in the diagnosis and appraisal of therapies to decide whether therapy should be administered is to transmogrify physicians and clinicians into moral legislators."

The workings of review committees may also be flawed. Even if the medical members of the board are not affiliated with the institution in which the patient resides, they may rubber-stamp the attending physician's decision because of their general proresearch attitude, as a manifestation of professional backslapping (since their own treatment proposals will later be reviewed by the committee), or in order not to further alienate the public by acknowledging that a doctor has made an error in proposing a therapy as potentially harmful and intrusive as psychosurgery. Meanwhile, lay members of a review committee may not feel that they have sufficient medical expertise to challenge the proposed psychosurgery. The one lay member of the informed-consent committee in the 1973 Michigan case approved the procedure, explaining, "As a layman I am unqualified to comment on any of the many technical aspects which are involved in the project. Therefore, we must all trust in the good intentions and competence of the hospital medical committee, psychologists, psychiatrists, neurologists, etc., who have reviewed and evaluated the case."

The conflicts of interest in the case of an incompetent patient might be offset by leaving the decision to perform psychosurgery to the courts. A proposed Massachusetts statute would go one step further by stating, "No institutionalized patient who lacks the capacity for informed consent to treatment shall be subjected to psychosurgery."

Current advances in state courts and legislatures provide no protection for noninstitutionalized people like Sandra, who "voluntarily" undergo the procedure. Thomas R., listed as a "success" in the Mark and Ervin book *Violence and the Brain*, was told that he should undergo psychosurgery because he suffered from delusions that his wife was having an affair with his neighbor. While he was recovering from the operation, his wife filed for divorce and later married the neighbor. A follow-up study of Thomas shows that the once successful engineer is almost a vegetable. The Washington, D.C., law firm of Edward Bennett Williams is now representing him in a suit against Mark and Ervin.

According to Dr. Peter Breggin, in an article in the Duquesne Law Review, the largest group of patients currently receiving psychosurgery are middle-aged women. True to the form of Freud, who libeled women by coining the disorder "hysteria" from the Greek word for womb, there is little to stop psychiatrists from prescribing psychosurgery as if it were Valium. But the use of the irreversible and experimental procedure except as a last resort on extremely ill patients may create more torment than those demons the Peruvians tried to unleash.

Dilemma 5 — A NEW PERSONALITY FOR THE PATIENT?

Peter James is 24 years old and has been confined to a mental institution for 18 of those years. In addition to being severely mentally retarded, Peter has a predisposition toward sporadic periods of uncontrolled aggression. During these periods he is capable of violent behavior. On numerous rampages he has injured other patients and hospital staff. At other times, he is gentle and loving and in fact cheers up the other patients.

The neurosurgeon at the hospital wants to try a new method of psychosurgery which could stop Peter's extreme aggression. This new method would involve implanting electrodes into Peter's brain and stimulating various parts of the brain electrically. Once the precise brain section responsible for triggering the aggression is located, an electric current will be turned on and that part of the brain tissue will be destroyed.

Before the neurosurgeon can operate, he must first obtain the permission of Peter's legal guardians; in this case, the guardians are Peter's parents.

Should Peter's parents authorize the surgeon to use these experimental procedures? Why or why not?

SAMPLE OPINIONS

Lori

"I think that Peter's parents would agree that the medical staff at the hospital know best. Besides protecting the other patients and the hospital staff, they will also be helping to protect Peter if they perform the operation. He won't be able to hurt anyone—not even himself. The patient has no control. If the doctor performs the operation, Peter's parents' consciences would be relieved knowing that he couldn't hurt others. Yes, they should let the doctor do the operation."

Kelly

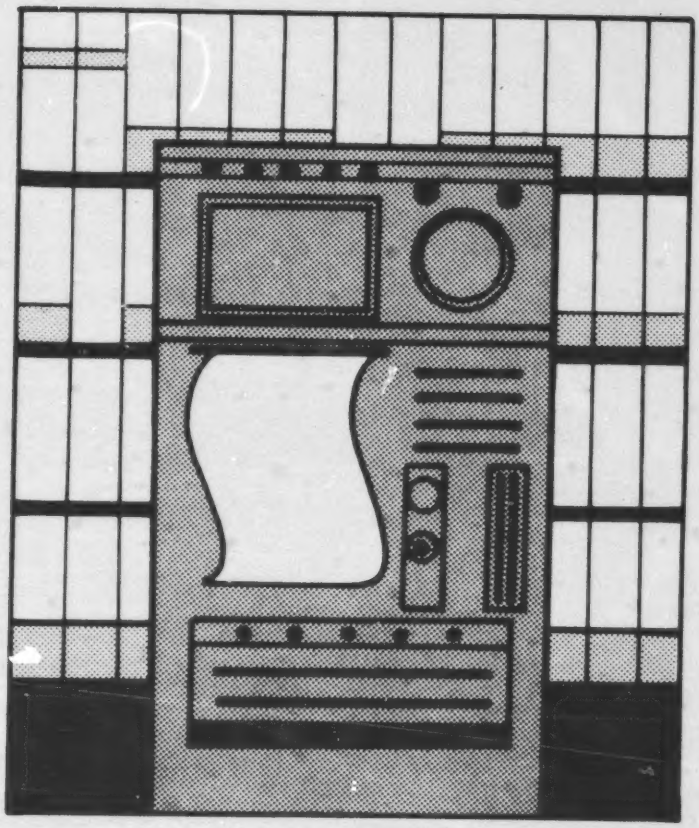
"No, the parents should definitely not allow the surgery. First of all, there is no absolute guarantee that the procedure will work. Secondly, psychosurgery is still a subject of debate among doctors. If doctors can't agree, how can the parents be sure that they are doing the right thing? They have a duty to protect their son from the whims of others. The hospital wants to make Peter docile so that their job will become easier. It just means that they wouldn't have to always be on the lookout for the sudden bursts of violence."

Paul

"No, they should not allow the doctor to perform the experimental operation. It is too drastic an operation. If the parents give consent, they are in fact supporting the idea that people have the right to control the minds of others. Peter, even if he is mentally retarded, is a human being, and his brain is what makes him human. Although only a small part of the brain will be destroyed, some part of Peter will be lost. One has to think about the dignity of the individual, even those in mental institutions. They cannot speak up for themselves so they must be protected from others who take advantage of their condition."

DISCUSSION QUESTIONS

- What obligations should Peter's parents have to their son? To the institution where he resides? Why?
- Would it make any difference in the decision if Peter were "normal" except for sporadic periods of uncontrolled aggression? Why?
- Who should benefit more from the brain surgery, Peter or the mental institution? In this case, does Peter really benefit?
- Should Peter's burden to the hospital staff be an important consideration in the parent's decision? Why or why not?
- If Peter has no natural guardian, should anyone else have the right to make such a decision for him? Why of why not?
- Should protecting other people from harm justify the operations to make aggressive persons docile? Why or why not? What if the aggressive person were a creative artist?
- Would society benefit if all aggressive people could be cured of their antisocial behavior by psychosurgery? What criteria might you use to select those to undergo treatment?
- Should society have a right to force aggressive people to undergo such drastic and irreversible treatment? Why or why not?
- Would society be any better off if imprisoned criminals were treated by psychosurgery before they are released? Why or why not?
- Some people have compared psychosurgery to taking part of a person's life. Is this a good analogy?
- What is the value or importance of an intact brain if the person might be a threat to others?
- What does human dignity mean to you?



Mass Screening For Psychological Disorders

Reading 1

Schizophrenia: Symptoms, Diagnosis and Cure

The development of the concept that schizophrenia is a single clinically diagnosable disease can be traced to Emil Kraepelin's recognition in 1896 that there was a relationship among three forms of insanity. Kraepelin united these three psychoses under the single disorder "dementia praecox" to differentiate them from other types of psychoses. This term, dementia praecox, indicates that the disease is a deteriorating adolescent psychosis. In fact, that disorder does often begin in youth and becomes progressively more severe with age. However, Eugene Bleuler recognized that the symptoms often don't appear until adulthood and that some patients do not reach a demented state. In 1911 Bleuler introduced the term "schizophrenia" to describe the condition.

Schizophrenia has been labeled the core problem of insanity. The symptoms bring about a serious disruption to the life of the patient and diminishes his/her ability to function effectively in society. The disorder commonly leads to the patient's progressive retreat into a world beset by delusion, hallucination and fear of involvement with life and people. Because of the diverse manifestations and final outcomes, schizophrenia is difficult to define and describe.

The disease is characterized by disordered thinking. The patient is unable to cope with the problems of living, withdraws within himself/herself, and seeks solutions to problems by elaborate mental constructs and fantasies. Usually, this is associated with a regression into a period of childhood when the concept of self has not been firmly established. The condition tends to persist because the patient refuses to test his/her ideas in terms of how they might help him/her master his/her environment and relate to others.

In the beginning stages the schizophrenic avoids facing problems and interacting with others, often by sleepng for long periods of time. When awake the individual spends an inordinate amount of time philosophizing and intellectualizing about his/her problems rather than acting on them. Gradually, withdrawal becomes more severe, communication becomes ambiguous and the inability to make a decision becomes a preoccupation. Delusion sets in; innocent remarks

and actions are misinterpreted as critical and hostile. The patient views himself/herself as victim and experiences the terror of persecution and the fear that his/her own suicidal or homicidal impulses will overcome him/her.

Schizophrenic reactions often occur in individuals who are shy, sensitive and somewhat egocentric. There is a significantly higher occurrence of these reactions in the lowest social groups.

Of the total number of people hospitalized on any given day in the United States (about 1.4 million patients), about one-quarter are hospitalized for schizophrenia. Many of these schizophrenic patients are released within one year. However, the average length of stay for all schizophrenic patients is 13 years because many patients are confined from their adolescence until their death at an old age. It is believed that many schizophrenics are never diagnosed or treated because of the vague nature of the symptoms. It has been estimated that between 14 and 20 of every 1,000 children born in the United States will actually be hospitalized with schizophrenia. Estimates of the same relative magnitude have been made for the Western world in general.

There are many theories concerning the underlying cause of schizophrenia. The belief that such drastic personality disorganizations characterized by disordered thinking and related to changes in brain function has stimulated the search for possible endocrine, toxic and biochemical factors. Investigators have often presented scientific data proving that one biochemical factor or another is a causative factor, only to have subsequent studies invalidate earlier findings. Neuroanatomical, endocrine and genetic investigations have not produced decisive conclusions about the underlying cause.

The high familial incidence of schizophrenia led to the generally accepted hypothesis that some genetic factor was involved. Early studies with twins showed that identical twins were more likely to share schizophrenic symptoms than either fraternal twins or brothers and sisters. More recent studies, however, have not reached the same conclusions.

It is more likely—based on present thinking—that the high familial incidence can be tied to the common environment shared by parents and children. Severely disturbed mothers and fathers may be producing schizophrenic children. The finding that schizophrenic patients usually grow up in seriously disturbed families lends support to this hypothesis. This view is also supported by the fact that the critical component of the various treatments proposed is the development of a warm, honest and supportive relationship with the schizophrenic patient. This relationship leads to the development of patient trust in the therapist and willingness to risk an encounter with the real world.

Biochemists are actively searching for the causative and diagnostic factors of schizophrenia. Several recent studies on chemical agents have fostered hope that they may provide the means for detection and cure of the disease. Of particular note is the work being done with creatine phosphokinase (CPK) activity in the blood serum.

CPK is an enzyme, a protein which catalyzes—speeds up—a specific chemical reaction occurring in the human body. It is present in all humans as three different types—a brain type, a skeletal muscle type and a cardiac type. These three types can be readily detected and differentiated by standard laboratory techniques such as chromatography and electrophoresis. The CPK found in blood serum is the skeletal muscle type. Elevations of serum CPK have been found in severely disturbed schizophrenics and patients with other psychoses.

Many factors can cause elevations of CPK activity in normal as well as hospitalized individuals. Intramuscular injections of certain medications produce an increased CPK activity in some people. Alcoholism, strenuous activity, sleep deprivation and muscle trauma have all been shown to cause an elevation in some people at some time. However, in experiments with schizophrenics and their relatives in situations where these factors have been eliminated, researchers have found them showing higher CPK levels than in other individuals. Although this diagnostic technique may be limited by the short duration of the CPK increases and by the fact that alcoholism, stress and injections may mask the CPK effect, the measurement of serum CPK activity may be useful until more reliable techniques are developed.

Reading 2

Computerized Insurance Records[1]

by Paul S. Entmacher, M.D. and Jeremiah S. Gutman

A middle age man with a history of inactive diabetes was employed by a new, small company which was beginning a group medical insurance policy. Because of his diabetes he was excluded from his company's medical insurance coverage. Out of concern for him, his fellow employees agreed to change insurance companies if another would agree to include him. They found such a company and made the switch.

The man was informed by the insurance agent that he should be quiet about the diabetes since the centralized computer of the insurance industry, for storage of patient medical records, did not yet have the information. According to one report, this computer has stored medical records of 12,500,000 persons. It is a strict policy of insurance companies that access to these computer records be available only to their medical departments, never the agents. The man, alarmed as well as concerned as to the type of data that might be stored on him, has sought to find out more about that computer. To date he has confirmed its existence, but has been able to discover very little more.

Earlier in life he had had two medical examinations prior to obtaining life insurance. He would now like to see if those records are in the computer. He has been told this information is privileged, but upon his written authorization the insurance company would send a letter to his personal physician summarizing the relevant information.

The man, however, does not have a close relationship with a physician. There is one he has seen about once a year for the past four years, but he does not want to have the information summarized by the insurance company and reinterpreted by a physician he does not know well. He wants to have an actual copy of the insurance company's computer record in his hands for his own examination.

[1]Reprinted by permission from *The Hastings Center Report*, Vol. 3, No. 6: November, 1973. Copyright © Institute of Society, Ethics and the Life Sciences, 360 Broadway, Hastings-on-Hudson, New York.

THE DUTY TO WITHHOLD

by PAUL S. ENTMACHER

Since 1890 insurance companies have shared medical information through a centralized bureau. In 1902 this bureau was reorganized under the auspices of the insurance company medical directors, and it became known as the Medical Information Bureau (M.I.B.). It remained under the auspices of the medical directors until 1947 when it was organized as a separate institution, but the medical directors continued to play a key role in its operation. In 1970, because of the large volume of reports that required handling, part of the M.I.B. operation was placed on computer. It is this computer file that is of concern in the case under discussion, but aside from the fact that medical information stored by the M.I.B. is now on computer rather than recorded on millions of individual cards, there has been no significant change in procedure for over 70 years.

Information obtained from the M.I.B. is used by an insurance company as one adjunct in the process of determining the risk presented by an insurance applicant in order to fix the amount of premium to be charged or to determine if a policy can be issued at all. Some applicants for insurance may have serious medical impairments and do not apply for insurance until this serious condition becomes manifest. They then find themselves in much the same position as a man applying for fire insurance when his house is on fire. Realizing that if they admit their medical history they may not be granted the insurance, some persons deny having the impairments.

The services of the M.I.B. are designed to help protect against this type of situation. The M.I.B. does not store the individual's complete medical record, nor even the complete insurance company file. Reports are submitted to the Bureau only by member companies, and these are in a brief, three-digit code form. Only the highlights of the insurance company's medical record are reported, and in large part the information is in very general terms, serving to alert the next company as to future insurance underwriting investigation. The medical information which is pooled and stored by the M.I.B. is considered to be confidential, and it is shared only with other member companies on a controlled basis. All member companies are required to have a medical director, and exchanges of information between companies are under this supervision. If the information in the Bureau is nonmedical in nature, the Bureau on request will make disclosure to the individual of the exact meaning of the code reports and their source.

Insurance companies are happy to release the medical information that they have in their files, but this is done through the applicants' or policyholders' personal physicians for several reasons. Primarily there is concern that the applicant or policyholder will be given medical information that he or she will not be able to interpret or that the physician feels should not be made known to the patient. When a medical report is obtained, it is obtained with the understanding that the contents of the report will remain confidential and will not be divulged to the patient or to any other person not directly involved in evaluating the insurance risk. The reports, therefore, contain detailed medical information that a lay person may misinterpret and become unduly alarmed by what appear to be serious abnormalities which are, in reality, inconsequential. On the other hand, the person may become aware of very serious abnormalities, knowledge of which the physician has withheld, feeling that the patient may be unable to cope with the problem. For example, an electrocardiogram may reveal changes which are significant, and yet no specific therapy may be necessary. Or a patient may have been operated on for a malignant tumor and not be told the exact diagnosis because the physician and the patient's family feel he or she should not be made aware of the diagnosis. Under these circumstances it would be harmful and not in the patient's best interest for an insurance company to discuss the medical diagnoses and findings directly with the patient.

A system has been devised, therefore, whereby the medical information in the insurance companies' files can be obtained. The procedure that has been established is intentionally somewhat cumbersome because of the desire on the part of the M.I.B. and the insurance companies to be absolutely certain that the information in the files is accurate. The initial inquiry is sent to the M.I.B., and the M.I.B. in turn asks the company that made the original report to verify that the information is on the correct person and that it is accurate. The M.I.B. then requests an authorization from the applicant or policyholder to send the medical findings to the physician whom he or she designates. When this is received by the M.I.B., it is sent to the reporting company, and the medical director of that company corresponds with the personal physician who in turn has an opportunity to interpret the findings and, if necessary, to discuss the significance of the medical diagnoses that have been established. In the case under discussion, the history of diabetes is, of course, known; but there may be other aspects of the medical history that are not known to the patient. For this reason it would still be best for the records to be sent to his physician. Also, with the history of diabetes, it would be prudent for the patient to be under closer medical supervision, and by insisting that he discuss his condition with his physician, he may be encouraged to develop this closer relationship.

THE RIGHT TO KNOW

by JEREMIAH S. GUTMAN

It is impossible, practically speaking, to disentangle the problem of access to medical records from the problem of maintaining the confidentiality of such records. There are probably few providers of health care who would not agree that no one should have access to the medical records of a patient without the consent of the patient, although a majority of such providers would probably disagree with me that the patient should be included among those who can have access. The case presented is easier and somewhat more narrow since an insurance company and the centralized computer of the insurance industry, with which we are here concerned, are by no stretch of the imagination providers of health care. The insurance industry has collect these data for its own business interests, in order to maximize its profits and minimize its potential losses. The interest sought to be protected and advanced by the insurance industry and its centralized computer is directly adverse to the interest of the insured or prospective insured. The existence of the data serves as a potential hazard to the insurability, credit rating and employability of the diabetic man in this case.

He has been told that if he gives his insurance company a written authorization, that insurance company will procure from the centralized computer serving that company, and others, such data as the computer managers wish to give to the company; that the company will then pass on to his physician such of the material as it thinks ought to be passed

along. Presumably, the doctor would then pass along such further edited material as he thought best.

If we were dealing with the physician and patient directly, with the problem of the physician's notes and observations and the extent to which they ought to be disclosed to the patient, the problem would be different. The only way the insurance industry centralized computer could have procured any data legitimately would have been through the patient himself, or sources authorized by the patient to make disclosure. These could include applications for insurance, claims for insurance benefits, and data forwarded by health care providers—either physicians, hospitals or others. Since the computer has gathered the data from sources made available by the patient himself, and since the only excuse for the existence of the data in centralized form is to protect insurance company clients of the insurance industry computer from possible fraudulent claims or concealment by the patient, it becomes difficult to believe that the insurance industry is concerned only with the medical well-being of the man in this case. By creating a centralized and computerized record of this man, the insurance industry has placed itself in a fiduciary position to him. It owes him the right to verify the accuracy of the entries made with respect to him; assurance that it does maintain the information under strict standards of confidentiality; and notification of each request for access to data concerning him so that he can withhold or grant consent as he deems best. He cannot intelligently determine whether to withhold or grant consent as he deems best. He cannot intelligently determine whether to withhold or grant such consent unless he has had an opportunity to see the data in their entirety and not in some summarized or possibly censored form.

The argument inevitably to be expected—that it is for his own good that he be permitted to know only what the well-trained and well-meaning professionals think best for him—can be met in terms of basic social theory. Society is formed and its institutions are created to serve each of us as an individual. The institutions do not have personalities and goals of their own. It is the individual who is the supreme value, and it is to him or to her that the duty of service is owed by the institutions created by the collective will of the individuals. Insurance companies, and computers serving conglomerates of insurance companies, are no exception to this rule of subservience to individual human values. The man in this case has not been declared a legal incompetent; he is by definition not an infant suffering from some legal disability. He is entitled, even if it is bad for him, to drink alcohol, smoke cigarettes, over-eat and perhaps worst of all, expose his psyche to the shock of learning what it is that others have had to say about him and caused to be recorded in the centralized computer of the insurance industry.

Even if we assume that there is potential harm to him in seeing the data—whether they be true, false, or some of each—it is he who wishes to assume that risk. Flattering as it is that the insurance industry wishes to protect him from that risk, he is entitled to reject such paternalistic concern. Life is a process of taking and surviving risks. The facing of truth about oneself may be the penultimate risk, but certainly at least a sound argument can be made that unwillingness to face the truth about onself can be the ultimate risk.

Dilemma 6 — HOW WILL THE INFORMATION BE USED?

Paul Stevens is a second-year medical student training to become a surgeon. This point in his education comes after much hard work and personal sacrifice. He worked his way through college because his family could not afford to help him. He graduated with honors and was offered a scholarship to attend medical school.

Through his roommate, Paul Stevens learned about a pilot study designed to investigate the feasibility of biochemical screening programs for the early detection of inherited diseases. At the urging of his roommate he volunteered to participate in the study as a member of the control group.

During the study, it was found that his blood serum contained a higher than normal level of creatine phosphokinase (CPK). Previous investigations has shown that schizophrenics had elevated levels of serum CPK, often many years before the symptoms of schizophrenia actually appeared. Paul's condition was reported to the chairman of his department who felt that it would affect his ability to perform as a surgeon, and immediately dismissed Paul from the program.

Paul brought his case to the Dean of the medical school and argued that the school had no right to dismiss him. He pointed out that he was a good student and met all the college requirements. Also, he felt that it was wrong to use the information obtained from the study to judge his future behavior, since there is no absolute proof that he is a schizophrenic.

Should the Dean reverse the department chairman's decision? Why or why not?

SAMPLE OPINIONS

Sally

"Yes, the Dean must reverse the decision. The chairman of the department clearly acted in an arbitrary way. First of all, he has no proof that Paul's elevated CPK level will cause him to later become a schizophrenic. However, most important is the fact that Paul did not know that information from the study would be given to his teachers and that it would be used as grounds for his dismissal from school. It's not fair to use the results of the study for another purpose. Also, they didn't test everyone else. It is as if Paul were used as a guinea pig."

Joyce

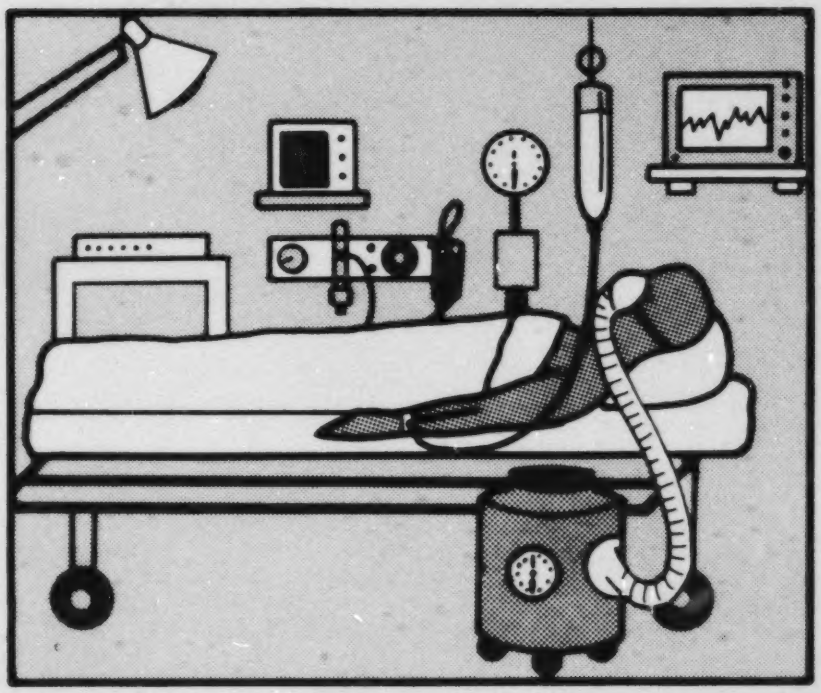
"No, the chairman of the department has a good point. If I went to a doctor I certainly wouldn't want to be treated by a doctor who is a schizophrenic. You can't tell what such a person might do. Also, the medical profession must keep some standards. A doctor who is a schizophrenic would surely give the profession a bad name. You can't let a potentially unstable person become a doctor. Think of how people might think about the school that graduated him and other doctors from that school!"

Elliott

"I think the head of the department has no legitimate reason for dismissing Paul. No rule has been broken here. The school doesn't require students to pass the CPK test before they become doctors. If there were such a rule, then I could see that the school would be justified in not allowing him to continue. Right now there is no rule about potential schizophrenics, and until a rule has been made the school can't deal with the situation."

DISCUSSION QUESTIONS

- Based on your knowledge about mental disorders, would you allow Paul Stevens to operate on you assuming, of course, that he completed his studies and became a surgeon? Why or why not?
- What should be the overriding concern in a case like this, the medical student's rights or society's right to be protected from possibly dangerous doctors? Why?
- Should the researchers have revealed the results of the experiment? Why or why not? What are their responsibilities?
- If Paul Stevens is allowed to complete his medical studies, and is found to be a schizophrenic and does injure a patient, who should bear the blame for letting him continue? Why?
- The elevated CPK in the blood serum is only a possible indicator for schizophrenia. But if it had been conclusively proven that the chemical is related to a schizophrenia, would your decision be any different? Why or why not?
- How might knowledge of having an elevated CPK affect one's life (even if one is not suspended from a school or job)?
- In an experimental study where the results may not be conclusive, should the subjects be told how they performed? Why or why not? Might the information be misinterpreted?
- How should subjects volunteering for an experiment be protected from the resultant information being misused against them?
- What should researchers do when in the course of studying volunteer human subjects they discover a condition in a subject that was not part of the study? What if the condition accidentally discovered might affect the well-being of an entire community? Is finding that a person has a communicable disease any different from finding a predisposition to abnormal behavior? Why or why not?



The Terminally Ill

Reading 1

Choosing Not To Prolong Dying[1]

by Robert M. Veatch

Lucy Morgan is a 94-year-old patient being maintained in a nursing home. Some years ago she suffered a severe cerebral hemorrhage. She is blind, largely deaf, and often in a semi-conscious state. Mrs. Morgan is an educated woman, the wife of the former president of Antioch College. About four years ago she wrote an essay, entitled, "On Drinking the Hemlock," in which she pleaded for a dignified and simple way to choose to die. Now she, like thousands of other patients in hospitals, rest homes, and bedrooms throughout the world, is having her dying prolonged. What, before the biological revolution with its technological gadgetry, would have been a short and peaceful exit is now often drawn out for months or years by the unmitigated and sometimes merciless intervention of penicillin, pacemarkers, polygraphs, tubes, tetracycline and transplantation.

Technology's new possibilities have created chaos in the care of the dying. What happens to Mrs. Morgan and others like her depends upon the medical and nursing staffs of the institutions in which these patients are confined. One patient may be mercilessly probed and primed with infusions so that dying is prolonged endlessly, while another in a similar condition may have heroic treatment stopped so that the process of dying may proceed uninterrupted, whether or not permission for the withdrawal has been given. A third patient may, with or without his consent, have an air embolism injected into a vein.

The issues at stake

Before examining some of the policies being proposed, we should get the issues straight. Lawyers and moralists make three distinctions in discussing euthanasia and the choice not to prolong dying. First, there may be legal and moral differences between directly killing the terminal patient and allowing him to die. In one study, 59% of the physicians in two West Coast hospitals said that they would practice what was called "negative euthanasia" if it were legal, while 27% said that they would practice positive euthanasia.

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Euthanasia has become a terribly confused term in the discussion. In some cases, it is taken literally to mean simply a good death; in others it is limited to the more narrow direct or positive killing of the terminal patient. In light of this confusion, it seems wise to ban the term from the debate entirely.

The legality of directly ending a patient's life is highly questionable, to say the least. Legal cases are very rare. The one decision which is particularly relevant is in the case of Dr. Hermann N. Sander, a New Hampshire physician who entered into the chart of a cancer patient that he had injected air into the patient's blood stream. He admitted that his purpose was to end suffering and pain and the jury returned a verdict for the defendant. But the critical factor in the case was the pathologist's testimony that he could not establish the cause of death with certainty. Thus the jury was not condoning "mercy killing." According to Curran and Shapiro in *Law, Medicine and Forensic Science*, "The general rule in the United States is that one who either kills one suffering from a fatal or incurable disease, even with the consent of that party, or who provides that party with the means of suicide, is guilty of either murder or manslaughter." It is safe to say that no lawyer would advise his medical clients that they would not be prosecuted if they practiced positive euthanasia.

On the other hand, the cessation of treatment may be a different matter, morally if not legally. It is well known that a competent patient has the right to refuse even lifesaving treatment. To my knowledge, there are no cases in which a physician has been brought to trial for stopping the treatment of a terminal patient. It seems most unlikely that he would be guilty of either moral or legal offense if a competent patient had ordered the treatment ended. If he had done so without the patient's instructions, however, the charge, presumably, would be abandonment. The legal status of ceasing to treat or omitting treatment is very much in doubt especially when a competent patient has not specifically refused treatment.

At the moral level, some recognize the difference between killing and omitting or ceasing treatment. Others insist that this kind of distinction is mere semantics, because in either case the result is that the patient dies. Yet, if we were given the choice of turning off a respirator to allow a terminal patient to die or actively injecting an embolism, almost all of us would choose the first act at least barring some extenuating circumstances which changed the moral calculations, such as the presence of extreme intractable pain and suffering.

There are two kinds of cases in which the distinction would make an actual difference. The first is when the prognosis had been in error and merely ceasing certain treatment could result in continued living, while active killing would result in death. The second involves the possibility of actual abuse. In any case, the physician should not be put in a position to dispose of unwanted patients. It is argued that for practical, if not moral, reasons, we need to separate active killing from cessation and omission of treatment, recognizing that many physicians favor the latter but not the former. It becomes expedient, then, to adopt a policy which would cover virtually all cases, minimize the chances for error, and be acceptable to a broader public.

It is a sad commentary on the tradition of medical ethics that the question of euthanasia is almost always raised in terms of what the medical professional should decide to do for a terminal patient: Should *he* treat; should he omit treatment; should *he* stop treatment; should *he* inject the embolism? Yet, there is another perspective: that of the patient. While the legal and moral status of killing and allowing a patient to die may be dubious, the principle of the right to refuse treatment is well recognized. It is morally and legally sound to emphasize the role of the patient as decision-maker when he is legally competent. Of course, this still leaves open cases when the patient is not legally competent, but at least we have a moral and legal foundation from which to form a policy. The next step would be to decide upon an appropriate agent for the legally incompetent patient.

Patient advocate

First priority should go to an agent whom the patient, while competent, would be permitted to appoint expressly for this purpose. When this has not been done, the next of kin should have both the rights and responsibilities to determine what is in the patient's interest. While the potential for abuse exists, the next of kin is in the best position to know the patient's personal values and beliefs upon which treatment-refusing decisions must be based. There would still be the established possibility of going to court to overturn the judgment of the next of kin in case he was acting maliciously or choosing not to prolong the patient's living rather than his dying. But the choice to refuse some death prolonging treatment should not, in and of itself, be taken as evidence of immoral or illegal activity. In that rare case where no relatives are available, a court-appointed guardian might provide the best safeguard of the patient's interests.

Ordinary and extraordinary means

A second distinction that must be clarified in a policy permitting the choice not to prolong dying is the difference between ordinary and extraordinary means. These terms have three meanings: usual vs. unusual treatment, useful vs. useless treatment, and simply imperative vs. elective treatment. The Catholic tradition as summarized by Pope Pius XII is: "Normally one is held to use only ordinary means—according to circumstances of persons, places, times, and culture—that is to say, means that do not involve any grave burden for oneself or another." Clearly, defining what is ordinary according to the circumstances named will make the distinction a difficult one. We can circumvent this entire quagmire simply by focusing on the moral principle of the right to refuse treatment as a basis for policy. This does not mean that it will always be moral to refuse treatment, but if patient freedom and dignity are to be central to policy decision, we may have to recognize that patients are entitled to make their own decisions and, therefore, to refuse even those treatments which are thought to be usual or useful. This might be the case when, for instance, a patient faces a lifetime hemodialysis regimen for chronic nephritis. Recently, such a patient decided that the thought of being attached by tubes for 16 to 24 hours a week for the rest of his life was an unbearable and dehumanizing possibility. He chose, we think morally and legally, to cease the dialysis treatment.

Allowing to live and allowing to die

Third, it is important to distinguish between the choice not to prolong dying and the choice not to prolong living. Two closely related cases which I have encountered recently reveal the difference. In the first, a baby was born with trisomy-18 and severe respiratory distress as well as gross CNS anomalies. He would not live no matter what heroic procedures were attempted. A second case was that of a mongoloid infant who had been born with esophageal atresia. The choice of the parents to refuse corrective surgery for the atresia was, in fact,

the choice that the quality of life as a mongoloid would not be satisfactory either for the infant or his parents. On the other hand, the choice to cease respiration for the trisomy-18 baby was made when there was nothing that man could do to save the infant's life.

Any policy which is adopted must come to terms with these distinctions, for it may be morally and legally acceptable to reject an unusually heroic and probably useless procedure but wrong, at least morally, to refuse a simple IV when it would lead relatively painlessly to many years of normal healthy life. It may be wrong to decide that someone else's life is not worth living but acceptable to recognize that even the forces of modern science are not able to cope with some diseases.

What should our policy be?

Some authorities say that we cannot adopt a systematic policy which would permit the choice not to prolong dying. The physician's duty, they feel is to preserve life. When some treatment can be offered, even for a patient who is almost certainly going to die, that treatment *must* be offered. Even if this view is correct, it is utopian and on which few clinicians would be able to accept if taken literally as a practical way of dealing with death. We must stop the heroic procedures at some point. If the only course available for a patient in his last days is to fly him and the medical team around the country to try some newly devised experimental surgery, at least some will say that morally we are not required to proceed or, in fact, that it would be wrong to proceed. At some time, the decision must be made that the dying process has been tampered with long enough and that there is nothing more that man can or should do.

Physician *ad hoc* decision-making

Four policy alternatives are currently being debated. The first is the defense of the status quo: We should have no policy at all. In fact, right now we do have a policy—the individual physician decides, on an *ad hoc* basis at the moment when the patient is in a terminal condition, if and when treatment should be given. This is sometimes done in consultation with other members of the medical team, members of the family, and the clergyman, but, for the most part, the real decision rests in the doctor's hands.

A strong case can be made for the present policy. At least ideally, if not in practice, the physician knows the patient's condition and is committed to his best interest. Every doctor is aware that each medical case is unique, and to develop more systematic decision making procedures could be very dangerous. Nevertheless, it seems to me that the present policy is the second worst of all possible alternatives. We have already seen that about half of the physicians in one study would exercise the choice not to prolong life if it were clearly made legal. There is also a difference of opinion among patients. A random pairing of patient and physician views would mean that if the physician is making the decision, in many cases the patient who would not want the dying prolonged will have this done against his wishes; another patient who desperately desires that last heroic operation will not receive it.

It may be even worse. There may be systematic differences between the medical professionals and the laymen. Many physicians claim that their special ethical duty is to preserve life. If the physicians have different ethical principles or even if they merely have different ethical judgments about what benefits the patient, it creates a terrible dilemma.

Even if physician and patient would reach the identical conclusion, the patient's freedom and dignity in matters most directly affecting his own living and dying would still be infringed upon. All of these objections have led to the search for other methods of decision-making.

The professional committee

In an attempt to take the burden off the shoulders of the individual physician, a growing number of hospitals now use committees of physicians to decide who should receive the last bed in the intensive care unit or the scarce and expensive hemodialysis treatment. The committee eliminates some of the random biases which an individual physician might have either in favor of excessively heroic intervention or inadequate treatment. Yet, is it right that a patient whose position is at one extreme or the other should have his own views moderated? Particularly if there are systematic differences between the professional and lay communities? Even the committee structure would impose upon many patients views which they find unacceptable.

This serious drawback to the committee must be added to the more obvious problem—that with the committee-making structure one loses the primary advantage of decision making by the individual physician. While, hopefully, he would know some details of the patient's life and values, we cannot hope that this would hold true for the committee. Even more significantly, the committee mechanism perpetuates the view that the medical professional by his training has some how acquired expertise in making the moral judgment about when it is no longer appropriate to prolong dying. If the committee structure is the alternative, perhaps we should stay with the status quo and let the individual physician make the choice unhindered and unguided.

Personal letters

Other alternatives are beginning to appear. The Euthanasia Educational Fund has drafted a letter which an individual might address to his family physician, clergyman or lawyer. It directs that "if the time comes when I can no longer take part in decisions for my own future, [and] if there is no reasonable expectation of my recovery from physical or mental disability, I request that I be allowed to die and not be kept alive by artificial means or heroic measures." This "living will" makes no pretense of being legally binding. It merely gives guidance to the physician and others concerned. It also frees the physician from having to guess what the patient's wishes might be.

The instructions are extremely vague, however, and while useful for general guidance, do not go very far in removing the difficulties of earlier proposals. For example, "reasonable expectation" and "artificial means or heroic measures" beg for clarification, and it is the reader of the will who will have to interpret. For this reason, we know of two physicians who have drafted very specific letters as instruction for their own terminal care. One instructs "in the event of a cerebral accident other than a subarachnoid hemorrhage, I want no treatment of any kind until it is clear that I will be able to think effectively. . . .In the event of subarachnoid hemorrhage, use your own judgment in the acute state. . . ."The other directs that there be no artificial respiration "to prolong my life if I had lost the ability to breathe for more than two or three (not five or six) minutes." While possibly more specific than the "living will," these instructions may not be of much help to the layman. He simply does not have the technical knowledge to be so precise.

In either case, the idea of a letter pre-addressed to one's

personal physician assumes that one has a personal physician. This, unfortunately, is not always the case. Also required is that one be dying in the care of the physician to whom the letter is sent. Carrying the letter in a wallet might help, but certainly will not do much to relieve the anxiety of the potentially dying patient. Even if one assumes that a personal physician will be caring for the dying patient, the letter still requires trust and understanding. This can no longer be assumed, but if such a relationship does exist, the need for the letter decreases in proportion.

Legislation to permit death with dignity

All of these problems have instigated legislative proposals which would give clearer procedures for the decision not to prolong dying. In 1969 a bill patterned after the British euthanasia legislative proposal was introduced into the Idaho legislature. It explicitly included both "positive" and "negative" actions and received very little support in this country. Rep. Walter Sackett, himself a physician has placed several proposals before the Florida legislature. One bill, which was introduced in 1970 but did not pass, would have permitted an individual to execute a document specifying that "his life shall not be prolonged beyond the point of a meaningful existence." If the patient himself cannot execute the document, the bill provided that the person of the next degree of kinship could. While this bill would have eliminated some of the problems of other proposals, the vagueness of the term "meaningful existence" is its critical flaw. The physician on the case presumably would be forced to determine whether or not the patient's life could ever again be meaningful.

A third type of legislation, to be based on the already existing right of the patient to refuse treatment, is worthy of consideration as a public policy. In cases where the patient is not competent, some agent must make the decision on the patient's behalf—that is an unpleasant reality of life. It seems to me that an agent appointed by the patient while competent should have first priority, then the next of kin, and finally, in the rare case where the patient has no relatives, a court appointed agent.

The physician would thus be protected from having to make a nonmedical, moral judgment about what is right for the patient. At the same time, the patient and his family would be able to fulfill their rights and obligations to look after the patient's welfare. Anything short of this will deprive the patient of life, liberty and probably happiness as well.

These four types of policy proposals will be receiving much more attention in the next few months. None of them is a panacea; each raises serious moral and public policy questions. But the chaos generated by biomedical technology's assualt on death demands new policy clarification. That new policy will be forthcoming soon. It must be.

Reading 2

The Dying Potential Donor Of An Organ

The dying patient who is a potential donor of an organ for transplantation presents new and special problems. Because of the need, at present, to perform the transplantation as quickly as possible after the death of the donor, his care as a patient may be jeopardized or his moment of death prematurely anticipated. The first of these hazards might be diminished by keeping the primary responsibility for his care in the hands of doctors other than the transplantation team. Doctors engaged in transplantation surgery are acutely aware of this need to protect the rights of the dying potential donor—and on some occasions have helped to reverse the apparent fatal course of such a patient. Avoiding the second hazard turns again on careful definition of the nature and time of death. This is especially true if the patient's death is being caused by acute intracranial trauma or disease. In this case, the time required to obtain neurological signs of death of the central nervous system — including a flat EEG tracing over a period of 4 hours — is too long to wait to remove an organ that is sufficiently viable for transplantation. Moreover, such neurological signs have less meaning in the acute situation measured in hours rather than in days. Hence the more conventional criteria of cessation of heartbeat and respiration must be used by the physicians responsible for such dying patients. We do not want to apply a double ethical standard: one for the unconscious patient with a head injury who is not being considered as a possible donor of an organ and another for the same kind of patient who is. If the clinical situation in the latter patient is such that there clearly is no chance for survival after his heartbeat or respiration has ceased spontaneously, then there is no ethical problem. But if there is any chance at all that he might recover after resuscitation, oxygenation of all organs might be maintained mechanically for the number of days necessary to establish that the minimum neurological criteria had been met for irreversible damage and death of the

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central nervous system, particularly the cerebrum. Only then might it be ethically justified in this kind of a patient to remove an essential organ and turn off the mechanical aids. In such circumstances, the patient might be considered to have died before the transplantation rather than after, and by the same criteria that are suggested for non-donor dying patients with head injuries. Admittedly such precautions may be less than satisfactory to the doctors responsible for the recipient patient. But to the public they should be reassuring, and the public *will* need reassurance as more and more dying patients are sought as a source of organs for transplantation.

Many legal problems can be anticipated in a situation where rapid decisions have to be made concerning the unusual disposal of parts of the body of a person who usually has met an unexpected violent or accidental death. One of the earliest legal cases deriving from uncertainty of definition and time of death in the donor of an organ was reported from Newcastle-Tyne in England in 1963. The potential donor of a needed kidney had been assaulted, had sustained a severe head injury, and had been admitted to the hospital in coma. When he stopped breathing on June 16 he was placed in a respirator and oxygenation was maintained for 24 hours until the recipient patient was ready to receive a kidney. On June 17 the kidney was removed, the respirator was then turned off, no spontaneous respiration remained, and the heartbeat and circulation ceased. The physicians believed that the patient died medically on June 16 when respiration ceased due to brain damage. The coroner ruled that death occurred legally when the heart ceased to beat on June 17 but that the doctors were not responsible for the death. The assailant was convicted of manslaughter. This case illustrates the urgent need for law and medicine to reach agreement on the definition of death, especially as applied to the potential donors of organs for transplantation.

Dilemma 7- THE PATIENT REFUSED TREATMENT

Mrs. Benjamin, a 67-year-old recluse, was found in her hotel room in a semicomatose state. She was brought to the emergency room of a nearby hospital because of a severe breathing problem. She was diagnosed as having a chronic lung disease complicated by pneumonia and advanced malnutrition. After treatment to clear her lungs of fluid, Mrs. Benjamin was put on a machine called a ventilator to regulate her breathing. She then became responsive and aware of her surroundings.

In recent days, however, she lapsed into periods of depression.She complained about the prospect of being hooked up to a machine for the rest of her life, her discomfort, and not being able to move. She told one of the nurses that she would be better off if her neighbor had not found her—then she would not have to go through all of this suffering.

The next day she again contracted pneumonia and refused to take the prescribed antibiotics. She said she wanted to die. She fell into a coma.

Should the medical staff ignore Mrs. Benjamin's wishes and continue the antibiotic treatment? Why or why not?

SAMPLE OPINIONS

Lewis

"Yes, the doctors have taken an oath to preserve life and to help their patients to survive. If they let Mrs. Benjamin die, they would be violating that oath and the rules and regulations set up by the state to prevent just this kind of action.

Besides, even though Mrs. Benjamin is in pain and anxious now, she still might get better. The statements she made when in a depressed state might be changed if she recovered fully. Whenever there is a situation like this, I think you have to give doctors a chance to administer a cure. Otherwise, the power of life and death which you are placing in the doctors' hands might be misused."

Angela

"Yes, the treatment should be continued. Although it may be painful to watch an elderly patient suffer, you can't sit by and do nothing. If you don't give her the needed antibiotic, you would be a murderer. What is a medical hospital if it does not provide the necessary treatment? If a person needs help, one should do one's best to help. In Mrs. Benjamin's condition, she may not be in a good frame of mind to make an objective judgment, and the hospital staff should not let her wishes dictate medical practice.

Somebody would have to stop the treatment and allow the illness to take its course. Who could do that? Imagine the guilt feelings that person would have for the rest of his/her life. I know that I couldn't do it.

Also, the hospital and the doctors could get into great trouble. Imagine how the public will react when word gets out that a patient was denied medication and allowed to die. People might even think that they did it because the woman had no friends or family."

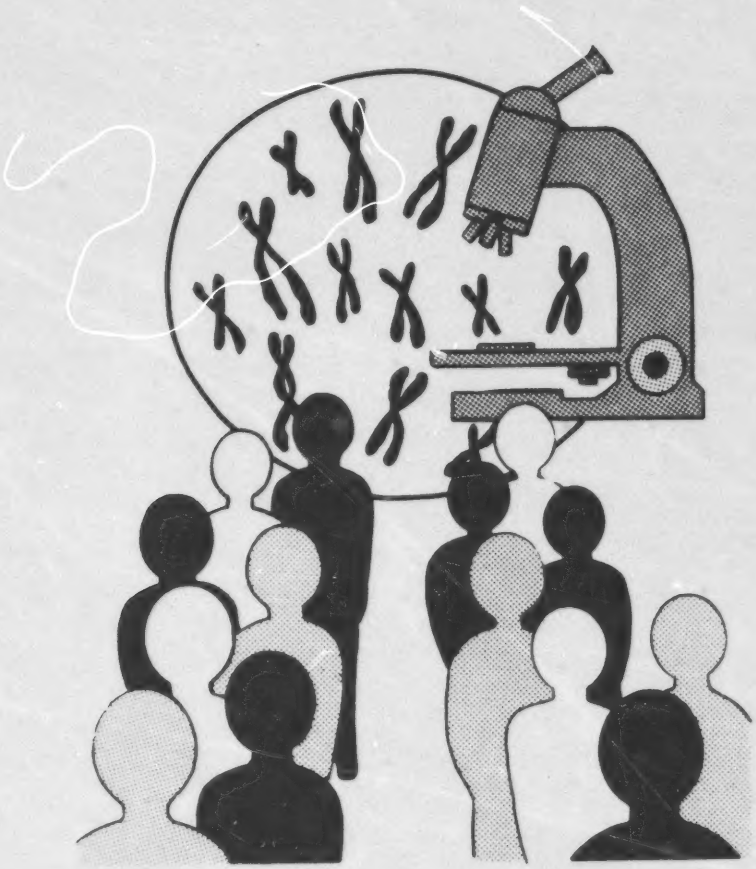
Ken

"In this case Mrs. Benjamin's mind has not been affected by her ailment. I think you have to respect the patient's request and withhold treatment. Every individual has the right to decide to live or die because each person has the right to determine the worth and condition of his/her own life. A person is the best judge of how he/she wants to live life and should be allowed to make the decision about treatment.

It is the doctors' duty to provide—to the best of their ability—accurate information about their diagnosis and about the possible types of treatments and probable results of those treatments. Beyond that, doctors can only protect the right of an individual to make his/her own decision about his/her fate."

DISCUSSION QUESTIONS

- Who should have the right to make the final decision in this case? Should the patient determine her own fate? Are the doctors in a better position to make the decision? Should the courts decide? Why?
- Should there be guidelines to assist the doctors and nurses or the courts in a case like this? Who should set the guidelines?
- Does a person have a duty or obligation to live when he/she doesn't want to? Why?
- If the doctors were brought to court, charged with murder, and found guilty, how should the judge sentence them? Why?
- What should society's responsibility be to people who want to die? Why?
- If a person were approaching death, is withholding treatment the same as discontinuing a treatment (such as pulling the plug on a respirator)? Why or why not?
- Medical care is expensive and requires highly skilled personnel. Should extraordinary life saving therapy be given to those who express the desire to die when the expense and talents could be used to provide better medical care for the poor and needy? Why or why not?



Mass Screening For Genetic Disorders

Reading 1

XYY: Harvard Researcher Under Fire Stops Newborn Screening

by Barbara J. Culliton

Since 1968, all baby boys born at the Boston Hospital for Women have been screened for chromosomal aberrations, particularly for XXY or XYY patterns. A couple of months ago, the genetics study was shut down by one of its principal investigators who says he was worn out by months of unrelenting pressure from advocacy groups that oppose XYY screening.

The pressure began last fall, when members of a science for the people group formally protested the continuation of the study, which was headed by psychiatrist Stanley Walzer and geneticist Park Gerald of Harvard Medical School (*Science*, 22 November). The group, informally led by Jonathan Beckwith of Harvard and Jonathan King of the Massachusetts Institute of Technology (MIT), charged that the study was unethical and harmful to its subjects who would be stigmatized by being labeled XYY. The medical school was asked to investigate the case, which it did. This spring the faculty, by an overwhelming vote of about 200 to 30, approved the continuation of the screening project.

However, Walzer, who has been following the behavioral development of the more than 40 XXY or XYY children picked up by the study, and who personally has borne the brunt of the criticism, decided he simply could not go on.

MIT biologist King says he thinks Walzer stopped screening because he finally saw that the risks of his research outweighed the benefits. But Walzer insistently says this is not the case. "I hope no one thinks I don't still believe in my research," he declares. "I do. But this whole thing has been a terrible strain. My family has been threatened. I've been made to feel like a dirty person. And, even after I won with the faculty, it was clear the opposition would go on. In fact, new groups were becoming involved. I was just too emotionally tired to go on." For example, lawyers for the Washington-based Children's Defense Fund went up to Boston not long ago to question Walzer about his work. Any

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even tentative thoughts they had about bringing some sort of legal action were, apparently, dropped when the screening stopped.

Males identified as being XYY are likely to be stigmatized because the chromosome is popularly, though incorrectly, thought of as the "criminal chromosome." Several years ago, there was quite a to-do when a study came out saying there were a disproportionately high number of XYY males in a prison population. The study was premature. No one knew, for instance, what the proportion of XYY males was in the general population. But it was widely and dramatically reported in the press. Today, all responsible scientists insist that the XYY chromosome is quite innocent of causing any crime, but it has not yet recovered from all the bad publicity it received.

Walzer agrees that talk of a criminal chromosome is nonsense, but he does think there are indications that some XYY males have reading problems and other learning disabilities and that they may have behavioral difficulties. Furthermore, he believes that, if he follows the children and identifies problems early, he can help them.

Beckwith, King, and others could not disagree more. In a recent telephone conversation, King reiterated his opinion that there is no scientific evidence linking XYY and antisocial behavior. And he stressed the opposition's strongly held belief in the self-fulfilling prophecy argument. If you label a child and tell his parents that he may grow up to be a problem, he is very likely to meet your expectations. In addition, King challenged Walzer's statements about being able to offer help to XYY children. He does not believe in the condition, and he does not believe in its cure. Says King, "I'm glad the screening has stopped now. (As far as is known there is no longer any XYY newborn screening going on in the United States.)

The pros and cons of XYY screening were debated throughout the fall and winter before more than one committee of the medical school. Harvard's standing committee on medical research held hearings on the issue. It concluded that Walzer's research should continue; its chairman, Dana Farnsworth, so reported to the full faculty.

The medical school's human studies committee, which must certify that research supported by the Department of Health, Education, and Welfare (HEW) meets HEW guidelines for human experimentation, reviewed Walzer's work. (It is supported by the crime and delinquency division of the National Institute of Mental Health.) Herbert Benson is chairman of the human studies committee. In response to questions, Benson said that the committee had agreed that the study complied with requirements that (i) informed consent be properly obtained, (ii) the patients' rights be protected, and (iii) the benefits of participating in the study outweigh the risks.

And then there was the overwhelming vote of the full faculty.

But things did not end there. Beckwith, it is said, did not try to continue to press his opposition through formal channels. But other advocacy groups began to get in touch with Walzer. And rumors began to circulate around Harvard to the effect that the Farnsworth committee had not endorsed Walzer's study at all and that Farnsworth had misled the faculty.

Beckwith, who feels that his point of view was not properly represented in the earlier *Science* article on the controversy, declined to comment on the present situation, except to say that the Farnsworth committee had voted by a majority of one against the proposition that the benefits of screening outweigh the risks.

Farnsworth emphatically denies the allegation that the committee came to that conclusion, although he acknowledged that the issue was debated during the deliberations. "At one point there were people who felt the question of risk hadn't been resolved, but, as we went on, the sentiment of the committee was distinctly in favor of Walzer continuing," he declares. Benson is equally firm in denying any allegations that his human studies committee came out publicly in favor of the study but was privately against it.

King, however, continues to believe there was more private opposition to the study than ever came out, and says people are keeping still for fear of risking the disapproval of faculty powers. And he correctly points out that Beckwith has not exactly made himself popular with the faculty for causing so much trouble. Being across the river at MIT, King has not been criticized as has Beckwith, who incurred his colleagues' particular wrath for taking the whole issue to the press.

King, however, has himself been the subject of one rumor—namely, that he tried to make direct contact with the parents of Walzer's patients in order to persuade them to drop out of the study. King is resolute in denying this. "It is simply not true that we tried to get in touch with the families," he stated. King said that friends of two of Walzer's families approached him and some of his colleagues about the situation, but that they never attempted to follow up.

Walzer reports that none of his families has dropped out of the study and that only one is considering doing so. He intends to continue watching the children's development.

The XYY issue is not an easy one. No one can deny the real, or at least potential, risk of stigmatizing a child. And it seems clear that no one knows with certainty what the behavioral risks, or physical risks, for that matter, of XYY really are. Walzer and Gerald maintain scientists should continue to try to find out.

Beckwith and King are among those who believe it is too risky to try. Their opinion seems to be that the pursuit of studies of the genetic basis of behavior is ill-advised, certainly at this time. At the conclusion of a critique of the XYY study they wrote last fall they said, ". . . we feel that the major effort in approaching the issue of behavioral problems should be one of changing the social and psychological (inseparable) conditions which generate them. We consider the attempts to determine a genetic basis for anti-social behavior, a diversion with harmful effects."

Reading 2

Ethical And Social Issues In Screening For Genetic Disease

A Report from the Research Group on Ethical, Social and Legal Issues in Genetic Counseling and Genetic Engineering of the Institute of Society, Ethics and the Life Sciences; Marc Lappé, Ph.D., Program Director James M. Gustafson, Ph.D. and Richard Roblin, Ph.D., Co-chairmen

Abstract: The potential advent of widespread genetic screening raises new and often unanticipated ethical, psychologic and sociomedical problems for which physicians and the public may be unprepared. To focus attention on the problems of stigmatization, confidentiality, and breaches of individual rights to privacy and freedom of choice in childbearing, we have proposed a set of principles for guiding the operation of genetic screening programs. The main principles emphasized include the need for well planned program objectives, involvement of the communities immediately affected by screening, provision of equal access, adequate testing procedures, absence of compulsion, a well defined procedure for obtaining informed consent, safeguards for protecting subjects, open access of communities and individuals to program policies, provision of counseling services, an understanding of the relation of screening to realizable or potential therapies, and well formulated procedures for protecting the rights of individual and family privacy.

In recent months a number of large-scale genetic screening programs for sickle-cell trait and sickle-cell anemia, and at least one for the carrier state in Tay-Sachs disease, have been initiated. Further proliferation of genetic screening programs for these and other genetic diseases seems likely, and in some cases participation in these programs may be made compulsory by statute. Since screening programs acquire genetic information from large numbers of individuals and families, often after only brief medical contact, their operation generally falls outside the usual patient-initiated doctor-patient relation. As a result, traditional applications of ethical guidelines for confidentiality and individual physician responsibility are uncertain in mass screening programs. Thus, we

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believe it important that attempts be made now to clarify some ethical, social and legal questions concerning the establishment and operation of such programs. In what follows, we have considered the goals that genetic screening programs may serve and have described some principles that we believe are essential to their proper operation.

Goals Served By Screening

It is crucial that screening programs be structured on the basis of one or more clearly identified goals and that such goals be formulated well before screening actually begins. We believe it will prove costly in scientific and human terms to omit or defer a careful evaluation of program objectives. Although there are three distinguishable categories of goals that screening programs may serve, we believe the most important goals are those that either contribute to improving the health of persons who suffer from genetic disorders, or allow carriers for a given variant gene to make informed choices regarding reproduction, or move toward alleviating the anxieties of families and communities faced with the prospect of serious genetic disease. The following are representative statements of goals that have been used to justify screening programs.

The Provision of Benefits to Individuals and Families

Such benefits may arise from enabling couples found by screening to be at risk for transmitting a genetic disease to take genetic information into account in making responsible decisions about having or not having children. This usually is done by providing genetic counseling services and informing couples about the nature of existing alternatives and potential therapies (e.g., sickle-cell screening). Another advantage consists in detecting asymptomatic persons at birth when amelioration of the sequelae of a genetic disease is already possible—e.g., screening for phenylketonuria (PKU).

Acquisition of Knowledge about Genetic Disease

Laboratory research and theoretical studies have had a major role in helping to understand fundamental aspects of human genetic disease. In addition, however, some large-scale screening programs may be needed to determine frequencies of rare diseases and to establish new correlations between genes or groups of genes and disease. In some such screening programs, no therapy may be immediately available for the pathologic condition, although the information derived from them may lead to therapeutic benefits in the future. Research programs aimed primarily at the acquisition of genetic knowledge per se are important. Yet we believe their value is enhanced when they also contribute information that is useful for counseling individuals or for public-health purposes.

Reduction of the Frequency of Apparently Deleterious Genes

Although little is known about the possible beneficial (or detrimental) effects of most deleterious recessive genes in the heterozygous state, the reduction of their frequency would be one way to decrease the occurrence of suffering caused by their homozygous manifestations. Nevertheless, as a goal of screening programs, the means required to approach this objective appear to be both practically and morally unacceptable. Virtually everyone carries a small number of deleterious or recessive genes, and to reduce the frequency of a particular recessive gene to near the level maintained by recurrent mutation, most or all persons heterozygous for that gene would have either to refrain from procreation entirely or to monitor all their offspring in utero and abort not only affected homozygote fetuses but also the larger number of heterozygote carriers for the gene.[1-3] However, substantial reduction in the frequency of a recessive disease is possible by prenatal screening and selective abortion, or by counseling persons with the same trait to refrain from marriage or childbearing.[3] Nevertheless, these means of reducing the suffering concomitant to recessive disease raise moral questions of their own.

PRINCIPLES FOR THE DESIGN AND OPERATION OF SCREENING PROGRAMS

Attainable Purpose

Before a program is undertaken, planners should have ascertained through pilot projects and other studies that the program's purposes are attainable. Articulating attainable purposes is necessary if the program is to avoid promising (or seeming to promise) results or benefits that it cannot deliver. It is also desirable to update program design and objectives continually in the light of the program experience and new medical developments. Consideration might also be given to incorporating additional purposes—for example, sickle-cell screening programs might profitably enlarge their scope to include other hemoglobinopathies[4] as well as general screening for anemia.[5]

Community Participation

From the outset program planners should involve the communities affected by screening in formulating program design and objectives, in administering the actual operation of the program, and in reviewing results. This involvement may include the lay, religious and medical communities as in the Baltimore Tay-Sachs program.[6] Considerable effort should be expended to make program objectives clear to the public, and to encourage participation. Recent articles describing detection programs for Tay-Sachs-disease heterozygotes[6] and for persons with sickle-cell trait or disease[7] have stressed the educational aspect of program design as the crucial component of successful operation. The principal value of community participation is to afford individuals knowledge of the availability and self-determination in the choice of this type of medical service. Educated community involvement is also a means of reducing the potential risk that those identified as genetically variant will be stigmatized or ostracized socially.

Equal Access

Information about screening and screening facilities should be open and available to all. To make testing most useful for certain conditions, priority should be given to informing certain well defined populations in which the condition occurs with definitely greater frequency, such as hemoglobin S in blacks and deficient hexosaminidase A (Tay-Sachs disease) among Ashkenazi Jews.

Adequate Testing Procedures

To avoid the problems that occurred initially in PKU screening,[8] testing procedures should be accurate, should provide maximal information, and should be subject to minimum misinterpretation. For detection of autosomal recessive conditions like sickle-cell anemia, for example, the test used should accurately distinguish between those carrying the trait and those homozygous for the variant gene.[4-9]

Absence of Compulsion

As a general principle, we strongly urge that no screening

program have policies that would in any way impose constraints on childbearing by individuals of any specific genetic constitution, or would stigmatize couples who, with full knowledge of the genetic risks, still desire children of their own. It is unjustifiable to promulgate standards for normalcy based on genetic constitution. Consequently, genetic screening programs should be conducted on a voluntary basis. Although vaccination against contagious diseases and premarital blood tests are sometimes made mandatory to protect the public health, there is currently no public-health justification for mandatory screening for the prevention of genetic disease. The conditions being tested for in screening programs are neither "contagious" nor, for the most part, susceptible to treatment at present.[10]

Informed Consent

Screening should be conducted only with the informed consent of those tested or of the parents or legal representatives of minors. We seriously question the rationale of screening preschool minors or preadolescents for sickle-cell disease or trait since there is a substantial danger of stigmatization and little medical value in detecting the carrier state at this age. However, in the light of recent information that sickle-cell crises can potentially be mitigated,[10] a beneficial alternative would be newborn screening that could identify the SS homozygote in early life, and thereby anticipate the problems and complications associated with sickle-cell disease and provide early counseling to the parents.

In addition to obtaining signed consent documents, it is the program director's obligation to assure that knowledgeable consent is obtained from all those screened, to design and implement informational procedures, and to review the consent procedure for its effectiveness. The guidelines available from the Department of Health, Education, and Welfare[11] provide a useful model for formulating such consent procedures.

Protection of Subjects

Since genetic screening is generally undertaken with relatively untried testing procedures[9] and is vitally concerned with the acquisition of new knowledge, it ought properly to be considered a form of "human experimentation." Although most screening entails only minimum physical hazard for the participants, there is a risk of possible psychologic or social injury, and screening programs should consequently be conducted according to the guidelines set forth by HEW for the protection of research subjects.[11]

Access to Information

A screening program should fully and clearly disclose to the community and all persons being screened its policies for informing those screened of the results of the tests performed on them. As a general rule all unambiguous diagnostic results should be made available to the person, his legal representative, or a physician authorized by him. Where full disclosure is not practiced, the burden of justifying nondisclosure lies with those who would withhold information. If an adequate educational program has been offered on the meaning of diagnostic criteria and subjects participate in the screening voluntarily, it may generally be assumed that they are emotionally prepared to accept the information derived from the testing.

Provision of Counseling

Well trained genetic counselors should be readily available to provide adequate assistance (including repeated counseling sessions if necessary) for persons identified as heterozygotes or more rarely homozygotes by the screening program. As a general rule, counseling should be nondirective, with an emphasis on informing the client and not making decisions for him.[12] The need for defining appropriate qualifications for genetic counselors in the context of screening programs and for providing adequate numbers of trained counselors remains an urgent one. It is the ongoing responsibility of the program directors to evaluate the effectiveness of their program by follow-up surveys of their counseling services. This may include steps (taken with the prior understanding and approval of the subjects screened) to determine how well the information about genetic status has been understood and how it has affected the participants' lives.

Understandable Relation to Therapy

As part of the educational process that precedes the actual testing program, the nature and cost of available therapies or maintenance programs for affected offspring, combined with an understandable description of their possible benefits and risks, should be given to all persons to be screened. We believe this is one of the items of information that subjects need in deciding whether or not to participate in the program. In addition, acceptance of research therapy should not be a precondition for participation in screening, nor should acceptance of screening be construed as tacit acceptance of such therapy. Both those doing the testing and those doing the counseling ought to keep abreast of existing and imminent developments in diagnosis and therapy[10-13-15] so that the goals of the program and information offered to those being screened will be consistent with the therapeutic options available.

Protection of Right of Privacy

Well formulated procedures should be set up in advance of actual screening to protect the rights of privacy of individuals and their families. We note that the majority of states do not have statutes that recognize the confidentiality of public-health information or are even minimally adequate to protect individual privacy[16]. Researchers therefore have a particularly strong obligation to protect screening information. Consequently, we favor policies of informing only the person to be screened or, with his permission, a designated physician or medical facility, of having records kept in code, of prohibiting storage of noncoded information in data banks where telephone computer access is possible and of limiting private and public access only to anonymous data to be used for statistical purposes.

CONCLUSIONS

Even if the above guidelines are followed, some risk will remain that the information derived from genetic screening will be misused. Such misuse or misinterpretation must be seen as one of the principal potentially deleterious consequences of screening programs. Several medical researchers have recently cautioned their colleagues of the potential for misinterpretation of the clinical meaning of sickle "trait" and "disease."[3] We are concerned about the dangers of societal misinterpretation of similar conditions and the possibility of widespread and undesirable labeling of individuals on a genetic basis. For instance, the lay public may incorrectly conclude that persons with sickle trait are seriously handicapped in their ability to function effectively in society.

Moreover, protecting the confidentiality of test results will not shield all such subjects from a felt sense of stigmatization nor from personal anxieties stemming from their own misinterpretation of their carrier status. Extreme caution should therefore be exercised before steps that lend themselves to stigmatization are taken — for example, stigmatization can arise from recommending restrictions on young children's physical activities under normal conditions because of sickle-cell trait, or from denying life-insurance coverage to adult trait carriers, neither of which are currently medically indicated. In view of such collateral risks of screening, it is essential that each program's periodic review include careful consideration of the social and psychologic ramifications of its operation.

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Dilemma 8 — TO KNOW OR NOT TO KNOW

A mid-western research hospital was conducting a mass screening of newborn infants. The purpose of this screening was to obtain data on the frequency of chromosome abnormalities in newborns. During the course of the study, it was found that two male newborns had an extra Y chromosome in addition to the usual XY gene makeup found in the majority of males.

Although the effects of this extra chromosome are not clear, it has been publicized that males with an extra Y chromosome (e.g., XYY complement) tend to be antisocial and often exhibit unusual aggression. This conclusion was based on a study conducted on prison inmates. A number of prisoners were found with XYY chromosomes. In a later, more extensive study, it was shown that the aggression theory was not true. XYY males were no more aggressive than other males.

Should the researchers inform the parents of the two newborn males that their children have the extra Y chromosome? Why or why not?

SAMPLE OPINIONS

Norman

"I definitely think the parents should know. Parents want to know as much as possible about their child. They are raising the child. If they are aware of a different condition, they can be better prepared to help their child. The researchers shouldn't keep the information to themselves because one can never know what will be discovered in the future about the XYY condition. It is even possible that XYY chromosome is beneficial in some situations. Of course, the researchers have to make sure the parents are not frightened about the negative and erroneous publicity surrounding the XYY condition.

If I were a parent and had given permission for my child to be studied I would certainly expect to learn the results. Keeping information from me would be the same as lying. Anyway, that information is on some record, and the parent would want to know what is recorded."

Lynn

"How could the researchers reveal the results of their study to the parents? The data is not totally clear. If that kind of information gets out, it could cause something like mass hysteria. Even if that didn't happen, the children would have to live their entire lives with a stigma; they would be singled out as being different. A lot of things could happen if the information got out. For example, the record could follow the child for the rest of his life, or the information could be misused by the institution or some other less scrupulous employee of the institution. A lot of bad publicity might result from this. It could even undermine any future research of this type. No, the information shouldn't be revealed."

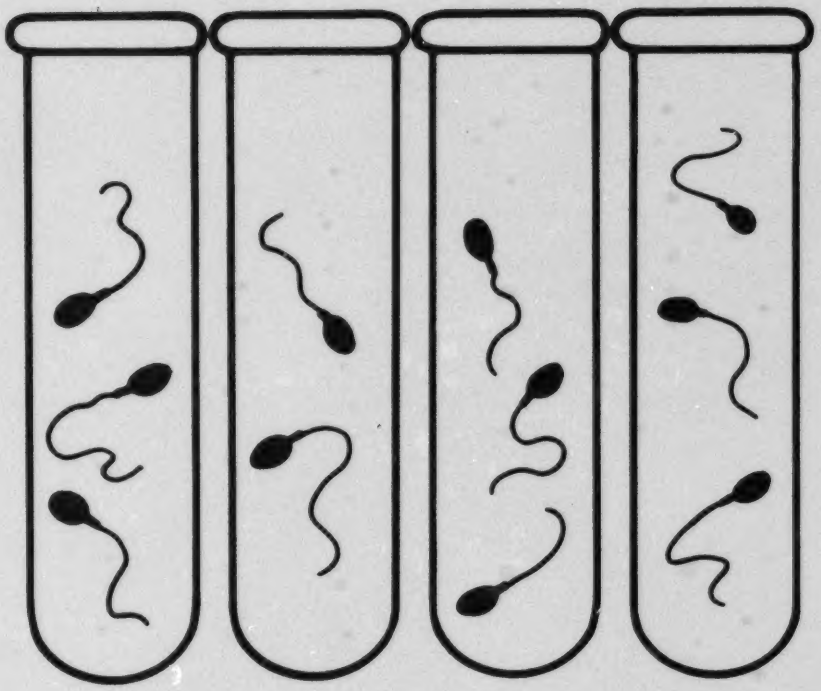
Anne

"Of course the researchers should tell the parents. Why should it be left up to the researchers to decide what people should or should not know. That's making the assumption that other people are less wise and intelligent and can't think for themselves. What is a democracy if scientists begin to judge what the public should be told? I don't think that scientists should be the final judge.

In this case, it is important that parents have the right to know."

DISCUSSION QUESTIONS

- In this case, should it be more important to reveal the truth or to prevent undue worry on the part of the parents? Why?
- What should be the primary concern of the researchers in this situation? (i.e., protection of society? protection of the newborn?) Why?
- If you were the parents, would you want to know that your child has an extra chromosome? Why or why not?
- How do you think the child would feel if he knew that his chromosome makeup were different from other males? Why?
- How important is the identification of XYY anomalies? Would society benefit if all newborns were screened for chromosome anomalies so that such persons can be identified? Would identification of genetic makeup be beneficial to the individual? (Do you think that a person who has been typecast as "bad" tends to reinforce such behavior?)
- What should society's responsibility be to those individuals who have been so identified? Why?
- Do you think that parents might feel any differently towards a child with an extra Y chromosome? Why?
- Speaking in general terms, how important is it to tell the truth? Are there any circumstances when the truth should be revealed?
- What if parents were the researcher's best friends and he knew that they would be very upset by the information about their child; should he withhold this information? Why or why not?
- If new techniques were developed to detect other genetically determined behavioral traits, should all newborns be required to be tested for the presence or absence of these traits? Why or why not?
- Should scientists publish research results based on limited evidence? What constitutes responsible reporting? Should the scientists have considered the consequences before they reported that a high proportion of men in prisons have XYY chromosomes? Why or why not?



Eugenics

Reading

Eugenics: A Controversial Topic

Eugenics, the term coined by Francis Galton, Charles Darwin's cousin, refers to any attempt to enhance human hereditary traits. It may involve decisions in medicine, education, economics, public policy or customs in order to give "more suitable" people a greater opportunity to produce larger numbers of offsprings. In this way hereditary qualities of humans would improve. One method suggested by Darwin would be to limit marriage among people who are weaker, physically and mentally. Hence, they would not pass their deficiencies onto further generations.

More recently, one of the major proponents of eugenics is Nobel prize geneticist, Hermann Muller. He has argued that modern medical technologies have promoted the survival of persons possessing what were in the past deleterious genes (diabetes, skeletal deformities, high blood pressure, cystic fibrosis, etc.). Also, the possibilities of deleterious mutations have increased through exposure to radiation (X-rays, fallouts) and chemical agents. He fears that the number of mutations in our gene pool has increased alarmingly, thereby increasing the dangers of passing genetic defects to future generations. He proposes the idea of sperm banks where sperm of males who are subject to radiation hazards in their work or living environment could safely store their germ cells in a deep freeze condition until such time that they desire children. The protected sperm cells would then be used to fertilize the egg of their mate. This plan could also serve to insure progeny in the event that the husband dies or becomes sterile. In addition, the sperm bank could be used as a repository of sperm from persons whom the community views as especially worthy. Their genetic qualities could thus be passed on to future generations by persons choosing to use the selected stored sperm. According to Muller, this will "... serve to direct the stream of genetic programs toward the factors underlying creativity, initiative, originality, and independence of thought, on the one hand, and toward genuineness of human relations and affections, on the other hand."[1]

[1]Hermann Muller. Human evolution by voluntary germ choice. *Science*, 1961, *134*, 643-649.

He further argues that science and technological advances have created a situation where fewer people are able to enjoy and appreciate those achievements and merely become "cogs in the mechanism." "Would it not be better if just about everyone were so constituted that he could share in the joy of understanding the great collective conquests of his species, such as mathematical relations, relativity and its development, cosmogony as known at the time, biochemical evolution, exobiology, mind-body relations, intra- and inter- mind workings, social and industrial organizations, the latest artificial mechanisms, and so on, instead of having such understanding necessarily confinded to a rare few, and compartmented among them at all?"[2]

The idea of selective breeding as proposed by Muller and Huxley poses many controversial questions. Geneticists point out that most human characteristics are governed by an interplay of different genes. Traits are not an absolute but are expressed in a graded fashion—for instance, tallness or shortness is not a single value. The children of a short couple may be short but are not exactly the same height. Furthermore, a genetic characteristic is only recognized when it is displayed (phenotypic expression), and this expression is influenced by many environmental factors. Some characteristics are advantageous only in certain conditions and not in others. The sickle cell trait, which in the homozygous situation affects the blood's capacity to carry oxygen, is advantageous for the heterozygote carriers in malaria-infected areas of the world. Persons who carry one sickle cell gene are less susceptible to malaria, and women carriers are more fertile. No one can tell when a normally undesirable genetic trait may suddenly, because of changes in the environment, become highly advantageous to an individual's survival. In answer to whether one can determine the value of certain genes, Dr. Arthur Steinberg, in a recent international genetics conference cautioned, "I remind you that the quality of a gene or genotype may be determined only by the reaction of the associated phenotype in the environment in which it exists. A phenotype may be disadvantageous in some environment, essentially neutral in others, and advantageous in others. In the face of a rapidly changing and entirely new environment (new in the evolutionary sense), I do not believe that we can determine the value of a specific genotype to the species."[3]

Further complications arise in determining what human characteristics are inheritable (having a genetic basis). "One of the problems is conceptual. Consider altruism; what does the term refer to: A feeling? A motive? Or a set of behavior patterns? Is it not the case that the social meaning of altruism (as well as other 'social virtues') depends on the kinds of context that elicit altruistic feeling, motives, and behavior? The problem here is very much like one that begets those who argue that criminal tendencies are heritable. What constitutes a crime may vary from society to society and from legal system to legal system."[4]

A more difficult question is, who will be the judges? "Both positive and negative eugenics as applied to populations presume a judgment of what is genetically good and what is bad. We have had at least one example of a sad experience with eugenics in Nazi Germany. This alone can serve as a lesson on the impossibility of separating science and politics. The most difficult decisions will come in defining the borderline cases. Will we breed against tallness because space requirements become critical? Will be breed against nearsightedness because people with glasses may not make good astronauts? Will we forbid intellectually inferior people from procreating despite their proven ability to produce a number of superior individuals? Or, should we rather provide an adequate environment for the offsprings of such individuals to realize their full genetic potential?"[5]

Additionally, an individual's genetic make-up is so diverse that he/she may possess an undesirable trait and yet have other highly desirable characteristics. "Even where we have identified a disease in which medical advances can be shown to have an overall population incidence, as in schizophrenia, few if any competent geneticists would advocate reducing the number of offsprings that schizophrenic individuals would be permitted to bear. The principal reason is ignorance. We simply do not know what (if any) intellectually desirable attributes are also transmitted with the complex genes responsible for schizophrenia. Bodmer notes that the conditions which have led to an increase in the frequency of schizophrenia may also conceivably increase the frequency of some desirable genetic attributes in other individuals.' "

Some scientists see other dangers in selective reproduction—the danger of reducing man's unpredictability. For example, Dr. George Wald has observed that with animals we have abandoned natural selection for the technological process of artificial selection. Animals are bred for what we want them to be: the pigs to be fat, the cows to give lots of milk, work horses to be heavy and strong, and all of them to be stupid. Through selective breeding we have domesticated animals who are docile and nearly all alike. Dr. Wald fears that this very same procedure can lead to a domesticated man. Moreover, promoting one attribute may lead to the weakening of others. Poodles, for example, bred for wooly hair are especially prone to suffer from serious ear troubles. Those desirable genes in individuals that we specifically select to proliferate are also associated with the unknown.

What is the effect if a population becomes genetically alike as a result of women being fertilized from sperm of a few men? The genes may be selected for a particular environmental condition. However, if the environment changes such that these genes are no longer advantageous, the population may not be able to adapt due to decrease in diversity. If the sickle cell trait were eliminated and a sudden malaria epidemic arose, few people would be protected from the disease.

Yet for carriers of a defective recessive gene, for instance, that which produces the disease PKU (a condition where the homozygous individual lacks the enzyme to oxidize the amino acid phenylalanine which leads to severe mental deficiencies), a sperm bank could insure the couple producing a child free from this genetic affliction (a person with one PKU gene and a normal gene shows no effect of the disease). Thus,

[2]Hermann Muller. In Elof Carlson (Ed.). *Man's future birthright: essays on science and humanity.* Albany, New York: State University of New York Press, 1973. (Reprinted by permission of the State University of New York Press, Copyright 1973)

[3]Amitai Etzioni. *The genetic fix.* New York: MacMillan Publishing Co., 1973.

[4]Martin Golding. Ethical issues in biological engineering. *UCLA Law Review,* 1968, 15:267, 486. (Excerpted by permission from The Regents of the University of California, Copyright 1968)

[5]Kurt Hirschhorn. On redoing man. *Annals of the New York Academy of Science,* 1970, *184,* 103-110. (Excerpted by permission from the New York Academy of Sciences, Copyright 1970)

innumerable genetic diseases such as Tay-Sachs, sickle cell anemia, cystic fibrosis, etc. could be prevented, but this does not assure that other mutations are not present. It has been estimated that each individual carries an average of four to eight defective genes which in combination with other defective genes governing the same characteristic could result in a child with a serious abnormality. To test for every mutation is an impossibility because each new mutation is an unknown. How does one look for something which one has never encountered? Furthermore, a mutation is not revealed until the individual bearing it demonstrates a visible functional anomaly.

However, if a couple comes to a sperm bank specially to insure producing a child of highly desirable qualities it is difficult to ascertain how truly advantageous these qualities will be for the future.

". . . there are problems in regard to the wisdom of the choice of traits, in regard to the original source of the traits, and in regard to the alleged advantageousness of the traits. First, how are we to determine which traits ought to be promoted? Paul Ramsey has complained that when positive eugenicists describe those human qualities to be selected and bred into the race of men, they write remarkably as if they were describing the attributes of mind and of character that make a good geneticist, or at least a good community of scientists. While no doubt intentionally exaggerated, Ramsey's comment presses the important point that the choice of traits is a value-laden one. It is by no means obvious which traits are the most valuable to mankind,'bad' traits being infinitely easier to ascertain than 'good' ones. And even if one were to select traits which virtually everyone admires (e.g., intellect and beauty), it would not follow that society would be improved if these traits were widely enhanced. Indeed, social problems would be increased if there were no employment for persons with similar talents or if we inadvertently enhanced the wrong traits.

"There are many incompatible but strongly felt visions of man's future, and even those who are given to visions of social control often alter those visions in the light of new facts and theories. Eugenicists generally tend to assume that we all agree or will come to agree on these traits, rather than present the required argument ot this effect. I very much doubt that this argument is forthcoming, as their views seem to rest on false empirical assumptions about the extent of evaluative agreement and also appear to rest on ideological and individual-preferential bases.

"Perhaps the most serious problem with positive eugenics is the assumption that the traits to be promoted in fact have a genetic rather than an environmental basis. The majority of the traits they mention involve higher cognitive and emotional capacities which are nurtured by education and which seem more subject to psychological control than genetic control. This is not the place to mediate the age-old nativist-environmentalist debate, but eugenicists may fairly be accused, I think, of a simple fallacy of reasoning. They move from the perhaps acceptable premise that every human trait has *some* genetically controlled basis to the unacceptable conclusion that every trait has an *entirely* genetically controllable basis. This claim not only downgrades causal consideration of environmental influence, but begs the critical question of whether the actual features of the desirable traits they promote are describable in purely genetic terms. It is not implausible to suppose that the more desirable features of their desirable traits are entirely or largely environmentally controlled, even if the traits are in some respects subject to genetic intervention."[7]

Muller on the other hand believes that

". . . we can *and must* improve greatly on nature's and the breeder's most successful attempts by using their performance criterion with the modern, far more advanced techniques and the best pooled foresight that are now available to us.

"Admittedly, all this election will be empirical, that is, based on performance rather than genetic analysis. After all, performance has been the criterion by which nature effected all our past evolution. Human discrimination, refined with the help of intelligent counselors, can however result in a far faster up-grading than nature has ever achieved in higher organisms, especially in regard to the two major characters that are being stressed. For considerable allowance can be made for the interfering effects of environment and of modifying genes, and heritability as indicated by close relatives can be taken into account. Knowledge of the actual genes concerned here is far from essential, however, and may be rather distant; each trait may well have many similarly action major enhancers.

"Of course, the couples would be warned beforehand that genetic segregation and environmental influences allow the results of no human reproduction to predicted, and that such selection as here depicted only weighs the results in their favor. It would however be pointed out that outstandingly good performance has almost always required a combination of both favorable environment *and* favorable heredity; also, that one-half of the child's non-sex-linked genes are those of the donor father. That the environment of these children also would tend to be favorable is indicated by follow-up studies on the families of those sterile couples who even today have resorted to artificial insemination, for their marriage and family life have turned out to be actually improved,on the average."[8]

[6]Marc Lappé. Moral obligations and the fallacies of genetic control. *Theological Studies*, 1972, *33*(3), 411-427. (Excerpted by permission from the publisher)

[7]Thomas L. Beauchamp. On justification for coercive genetic control. In James Humber and R. Almeder (Eds.), *Biomedical ethics and the law*. New York: Plenum Press, 1976. 370-371 (Excerpted by permission from the author)

[8]Hermann Muller. In Elof Carlson (Ed.), *Man's future birthright: essays on science and humanity*. Albany, New York: State University of New York Press, 1973

Dilemma 9 — IS THERE A NEED TO IMPROVE ON NATURE?

Darius Land is Prime Minister of a small, underdeveloped country where farming and herding provide a subsistence level of living for its people. It is a country with few mineral resources and exportable products. The Prime Minister believes that unless some major changes take place his country will always remain poor, dependent, and in the shadow of the wealthy, highly industrialized nations. He believes that for his country to advance into the modern world of industry and technology, it must increase the number of educated, intelligent people. These people will, he feels then take on the roles of engineers, industrialists and scientists and move the country out of its present state of bare subsistence agriculture.

The Prime Minister issued a proclamation directing the method of all future procreation in his county. Henceforth, all couples desiring children will register at their local health clinic. At the appropriate time the wife will be fertilized with sperm from the government approved frozen sperm bank. This sperm will be from donors of outstanding intellectual an creative abilities, excellent physical health (and no detectable genetic diseases), and a cooperative, gentle nature. Couples who produce children by natural fertilization will be fined half their annual crop harvest.

This decree was brought to the attention of the United Nations. Should the U.N. allow this government leader to impose this restrictive procreation policy on his country? Why or why not?

SAMPLE OPINIONS

John

"There is really nothing that the U.N. can do. It doesn't have the authority to interfere with the internal affairs of another country. To do so would threaten the U.N. as an institution. It must recognize the sovereignty of nations.

If the people of the country are willing to put aside their personal desires to the great benefit of their country, this is reason enough for the other countries to accept their combined wishes. The question is a contract made between the people and their government. If the people object to laws they cannot abide by, then it is their responsibility to demand changes or replace the government. The ruling in this case was intended as a positive effort to advance the country into the industrial age. Government regulation of reproduction must be viewed as necessary in this case. The government leader must be respected for his wisdom and concern for the welfare of his country."

Charles

"The U.N. cannot support this infringement on human free choice on the question of child bearing. The protection of basic human rights must be regarded as the prime concern of any government. Basic human rights include the freedom to make decisions about one's personal life. For government to rule who and how one should procreate is a clear violation of humanity. It makes judgment about the value of human life. It is not for any government or government authority to make such a judgment. This action reduces human beings to a commodity with a price tag. It says that persons possessing certain qualities are considered more human than others.

The implications of a government ordering the method of child bearing are too important for a body such as the U.N. to ignore. It is, in fact, a statement that an individual is to be judged by his/her worth to society and not his/her importance as a human being. One's human rights, whether one is a brilliant scientist or a diligent farmer, must be viewed as equal and protected with the same degree of integrity. Otherwise, humans could become no more than maleable objects."

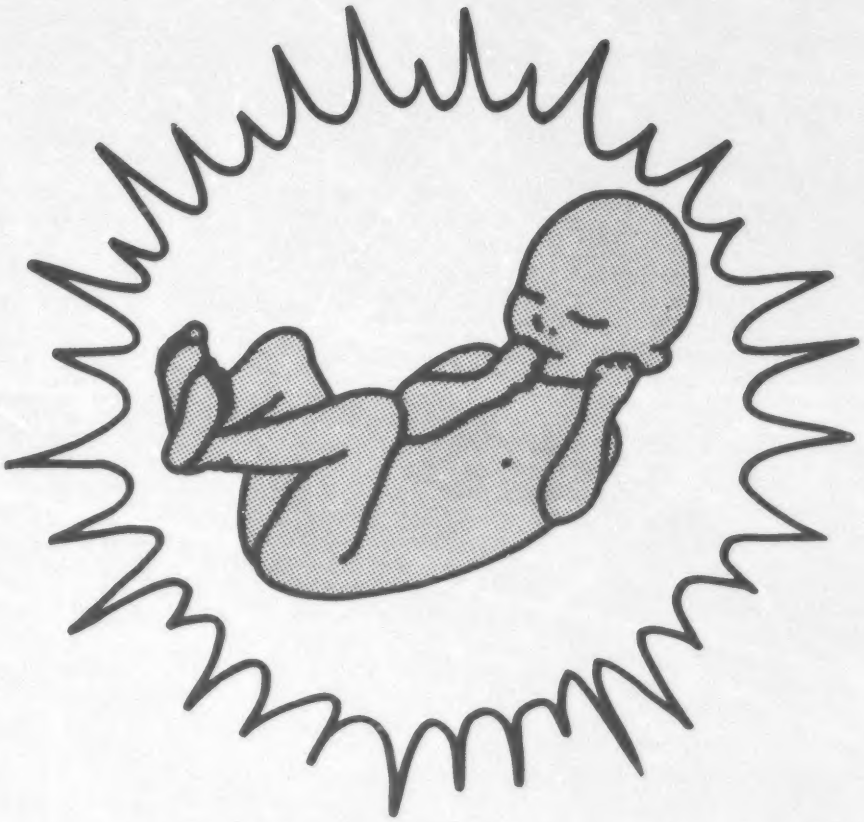
Gladys

"The U.N. should not allow this to happen. The member nations of the U.N. should recognize that such a policy is clearly outrageous. It is cruel and inhumane for a government leader to interfere in such a personal matter as a couple's child bearing desires. The Prime Minister's decree is going against what is natural. We all know that the greatest happiness of a man and woman is to bear their own natural children. How can a husband accept a child who is not his own flesh and blood? Although the people may want to do what is best for their country, there might always be that underlying feeling on the part of the parents that they cannot love a child who is not all their flesh and blood. There is also the question of parents' authority. Will the child obey the father in the same way that he/she would a natural father?

This is indeed a cruel ruling that would raise havoc in family relations, and the U.N. should make sure that controlling human reproduction in this way is not permitted.

DISCUSSION QUESTIONS

- Should one country have the right to interfere with the internal policies of another country? Why or why not?
- If you were a citizen of that country, what should your primary concern be—the future prosperity of your country or your personal freedom and happiness? Why?
- Should it make a difference to the U.N. if the Prime Minister decreed that couples can have only two children? Why or why not?
- What actions can the U.N. take?
- How might society be affected if a government could stipulate the type of genetic characteristics one should inherit?
- Would it make a difference in family relations if the parents are not the natural parents? Why or why not?
- Is the ruler of the country taking into account the best interest of his country?
- Should society promote the establishment of sperm or egg banks? Why or why not?
- Is it possible to say that some genes are more valuable than others? Does this change in any way the notion of human rights?
- If people were able to, should they try to improve on nature by selective reproduction? Why or why not?
- Is there any difference in selecting for the sex of a child and selecting for other desired qualities?
- How might society be different if people could "shop" for the kinds of genes they want in their prospective child?
- Would you feel any differently towards your parents if you were a product of artificial fertilization? Why or why not?



Infanticide

Reading

Intensive Care For Newborns: Are There Times To Pull The Plug?

by Barbara J. Culliton

Would it ever be right not to resuscitate an infant at birth? Would it ever be right to withdraw life support from a newborn whose chances of surviving on its own and living to lead anything even close to a normal life are virtually nil?

To each of these questions a group of physicians, lawyers, social workers ethicists, economists, and laymen unanimously answered, "Yes," when they considered the "Ethical issues in newborn intensive care" at a conference in the Valley of the Moon in northern California. Their thoughts on this complicated subject and a "moral policy for neonatal intensive care" they are proposing will be spelled out in the June issue of Pediatrics.

The need for a coherent policy on questions of life or death for critically ill new borns is urgent. Neonatal intensive care units, in which newborns are treated with increasingly sophisticated medical care, used to be few and far between. Now, there are dozens spread across the United States, each prepared to receive desperately sick newborns from miles around. And more and more babies who, only a few years ago, would have died within weeks or months of birth are being saved. Thus, infants with Down's syndrome, hydrocephalus, and a number of other genetic and congenital disorders are living. Remarkable progress in resuscitating infants with respiratory problems is saving significant numbers of lives, including those of premature babies who are just too tiny to make it on their own.

This was brought out clearly last month, when Richard E. Behrman and Tove S. Rosen of the College of Physicians and Surgeons, Columbia University, delivered what is probably as comprehensive a report as exists on the subject of fetal survival to the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. Although the researchers are careful to point out that their data and conclusions are severely limited by the fact that there is very little comprehensive statistical information on the

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subject, it is nonetheless apparent from the information they gathered for the commission that, from one point of view, things are improving. For example, data from New York City for the years 1962-1971 show a 68 percent improvement in survival rates for infants born weighing less than 1000 grams.

The question, to which there is no simple answer, is whether these saved infants are normal or whether there are occasions when medical technology does for the very young what it now frequently does for the very old—keep the body alive but not the mind.

California Conference

The Valley of the Moon conference was convened by 3 men from the University of California at San Francisco. Two of them are doctors: Roderick Phibbs and William Tooley. One is a Jesuit philosopher: Albert R. Jonsen. Discussion was directed toward problems raised by five case summaries and, in the end, the convenors drew upon the contributions of the 17 conference participants in formulating the moral policy they offer to "health professionals involved in neonatal care for their critical consideration."

Their feeling is that a policy, or some mechanism for making decisions, should be in place in every neonatal intensive care unit in advance of the moments of crisis during which life and death decisions must actually be made.

"This moral policy will have an air of unreality about it," they declare. "This is the inevitable result of considering moral decisions apart from the agony of living through these decisions. It reflects the abstraction from the actualities of fear, self-interest, exhaustion, the dominance of some and the truancy of others charged with responsibility and duty. But the air of unreality is, we believe, the necessary cool moment which philosophers say should precede any reasonable judgment."

To put the essence of their moral policy in its starkest form, they suggest that there are indeed circumstances in which it is all right to let a newborn baby die.

Not everyone agrees.

The opinions and beliefs of people on each side of the issue are of more than academic interest to each other. Among other reasons for this are cases in which one group has tried to use the power of the law to impose its will on the other. A recent situation in Norfolk, Virginia, is illustrative. A baby was born with hydrocephalus, an accumulation of cerebrospinal fluids in the brain. The fluid-filled head swells. Often the damage is so severe that the infant will never be able to participate even minimally in human experience. A decision was made not to feed the Norfolk baby. However, according to newspaper accounts, the Virginia Society for Human Life intervened, even to the point of trying to have prosecuted whoever made the decision to let the baby starve, and the child was sent home. There are those who believe the society's interest in the case is good; others think the "right-to-life" group had no business becoming involved.

The participants in the Valley of Moon conference considered the dilemma of neonatal intensive care from a number of points of view. They assessed the state of the medical art, including that of predicting whether a baby will suffer serious handicaps and concluded that, although it is generally not possible to make an accurate prognosis, in part because some forms of mental retardation are not apparent for a matter of years, "neonatal intensive care has improved chances for survival and has reduced the numbers of survivors with severe brain damage."

They thought about the legal and economic questions involved in neonatal intensive care and the effects a premature, sick, or defective baby can have on its family. F. Raymond Marks of the University of California School of Law, Berkeley, drew an analogy between a defective child, and an unwanted fetus which, he noted, can be legally aborted. "The maintenance of a defective child, like the carrying of a fetus to full term, may involve not only broad social costs, but a threat to its family's viability," the conference report notes, adding that "Marks argues for a social policy that would withhold legal personhood from certain carefully defined categories of high risk infants until a clear diagnosis and prognosis can be made concerning them and until their parents have made an informed decision whether or not they want to keep and nuture these infants."

Crux of the Argument

It is just this sort of position that stirs tremendous controversy. Some persons find it eminently sound. Others think it clearly wrong. It is reminiscent of something that the assistant district attorney of Suffolk County said to the jury during the trial of Boston physician Kenneth C. Edelin (Science, 7 March). Summarizing his case that Edelin had committed manslaughter in the death of a fetus during a legal abortion, Newman A. Flanagan argued in impassioned tones against postponing legal personhood, declaring that a baby has to have full rights from the moment of birth, not an hour, or a week or a month later.

The Valley of the Moon conferees were well aware of conflicting points of view. They believe it to be all the more reason for adoption of a moral policy to guide individuals faced with these life and death decisions. "When a multitude of individuals, with diverse moral convictions, face a series of decisions about similar cases, some way should be sought to accommodate diverse private beliefs within some degree of broad agreement about how such cases should be managed. This effort we call making a moral policy."

Their conclusions:

- Every baby born possess a moral value entitling it to the medical and social care necessary to effect its well-being.
- Parents are principally responsible for all decisions regarding the well-being of their newborn children.
- Physicians have the duty to take medical measures conducive to the well-being of the baby in proportion to their fiduciary relationships with the parents.
- The state has an interest in the proper fulfillment of responsibilities and duties regarding the well-being of the child.
- The responsibility of the parents, the duty of the physician, and the interests of the state are conditioned by the medico-moral principle, "do no harm, without expecting compensating benefit for the patient."
- Neither physicians nor parents are obliged to initiate or to continue actions which do harm to the well-being of a newborn infant. That well-being consists generally in a life prolonged beyond infancy, without excruciating pain and with the potential of participating, in at least a minimal degree, in human experience.
- . . .Should it be necessary, in the case of disagreement between parents and physician, to seek legal judgment, either to continue or to terminate care, the court should weigh heavily the prognosis regarding quality of life and the injunction, "do no harm."
- If an infant is judged beyond medical intervention, and if it is judged that its continued brief life will be marked by pain or discomfort, it is permissible to hasten death. . .

- If it is necessary to discriminate between several infants [because of lack of space in a newborn intensive care unit] it is ethical to recommend that therapeutic care for an infant with poor prognosis be terminated in order to provide care for an infant with better prognosis.

- The framers of this moral policy describe the criteria they have set forth as "conservative. . .in the hope of steering a middle course between an undiscriminating policy of saving and sustaining all life and an inconsiderate consigning of the most vulnerable to destruction."

Dilemma 10 — THE CHILD COULD BE SAVED . . . BUT AGAINST THE WISHES OF THE PARENTS

Mrs. Matthews, mother of two normal children, gave birth to a premature baby boy. Soon after birth, the child was diagnosed as a mongoloid with the added complication of an intestinal blockage. An operation could correct the problem, but there is a risk involved. Without the operation, however, the child could not be fed and would die.

At the time of birth, Mrs. Matthews overheard the doctor express his belief that the child was a mongoloid. She immediately indicated she did not want the child. The next day, in consultation with a physician, she maintained that position, refusing to give permission for the corrective operation on the intestinal block. Her husband supported her in this position.

The hospital staff could not agree with the parents' decision. The staff went to court to obtain a court order to allow the doctors to treat the child.

Should the judge issue the order to perform the operation necessary to save the baby's life? Why or why not?

SAMPLE OPINIONS

Liz

"The judge should not issue the order to perform the operation. The baby would require special care throughout its life; this corrective operation would only be the beginning of a long list of special needs and services. Since mongoloid children are usually trainable, this child will require special schools and teachers to enable him to perform even simple tasks. Even with special teachers to assist them, the parents would have to devote large portions of their time and money to raising their baby. This would be an unfair burden to place on the parents and on the rest of the family.

The parents are in the best position to be able to make this decision, not the courts, and the parents have made their decision. If he lived, the boy would be unloved and would be a disturbing influence on the entire family."

Debbie

"The court should intercede on behalf of the mongoloid baby and permit the doctors to perform the operation. There are some rights and values which must be upheld in society regardless of majority opinion. One of these is the right to life. In our country it is guaranteed by the constitution—and without reservations. The value of life can't be measured according to the intelligence, appearance or ancestry of the individual. Regardless of personal characteristics, a person is entitled to a chance at life.

I think that humanity as we know it would be destroyed if the right to life of an individual rested in the hands of another person. It is absolutely essential that the right to be kept alive be an inalienable right. I mean, look at what happened in Nazi Germany when that right was taken over by the government."

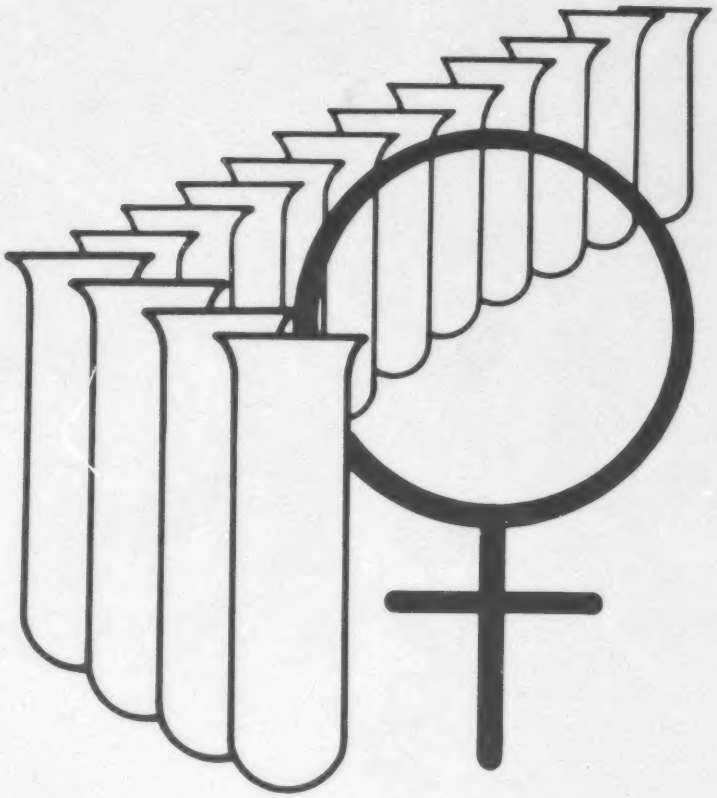
Art

"In making a decision of this sort, I think that the most important thing to consider is the effect of the decision on society. If the parents are forced to let the baby boy live, they will probably refuse to take him from the hospital. The baby will then become a ward of the state, requiring large amounts of money to feed, clothe and shelter him for the rest of his life. Since the child will not be able to contribute to his own welfare or the general welfare of society, it is best to abide by the parents' decision.

In our country parents have a legal right and responsibility to make all decisions for their children until the children reach the age of 18. The parents are exercising their legal right by making a decision about the operation. The court has no right to interfere in this legally guaranteed parental decision."

DISCUSSION QUESTIONS

- What responsibilities should the mother have for her child? Why?
- Should having a mongoloid child in the family and its possible affects on the other children and her husband influence the mother's decision? Why or why not?
- Does the hospital staff have a right to intervene and secure the court order? Why or why not?
- If you were in Mrs. Matthew's predicament, what factors would be considered in making a decision? Why?
- Does the mother have the right to decide what can or cannot be done to her child? What rights should the child have?
- What does one do if the operation were performed and the child lives, but the mother refuses to take the child home? Should the court have the right to force the mother to take the child? Why or why not? Who should be responsible for the child?
- Would society be better off if abnormal babies were left to die? Why or why not? How does one judge what is normal or abnormal?
- Is there any difference in aborting fetuses known to be abnormal and letting an abnormal baby die at birth?
- It is possible that the mongoloid child could live until old age. However, in cases such as a Tay-Sachs afflicted child, who lives no longer than a few years or even a few months with a progressively debilitating disease, would it be better to relieve the suffering of everyone concerned by letting the child die immediately after birth? What about people who have genetic diseases that don't show up until middle age, such as Huntington's disease (this is the disease Woody Guthrie had)?



Test Tube Babies

Reading 1

New Human Prospects

In *Brave New World* Aldous Huxley presented the prospect of a future society comprised of persons identical in every way. In that world it was possible to grow embryos in the laboratory from cells preselected for certain desired characteristics. Although his idea may still be in the realm of science fiction, biomedical progress has brought certain aspects of Huxley's ideas to fruition.

In 1950 Dr. Landrum Shettles of Columbia first reported the successful fertilization of a human ovum in the laboratory which survived for six days. In Italy in 1961 Dr. Daniel Petrucci maintained an embryo fertilized in the laboratory for 29 days. A heartbeat could be detected but because the embryo became large and deformed it was destroyed. Dr. Petrucci stated that his intent was to explore ways to culture organs so that when they were transplanted into recipients they would not be rejected as a foreign, unacceptable object. Most recently, Dr. Robert Edwards and Dr. Patrick Steptoe of Cambridge University perfected the technique and the first "test tube" baby was delivered in 1978. In their embryo transfer procedure an egg was removed from the mother and fertilized with the father's sperm in the laboratory. The embryo was allowed to develop for several days and then implanted in the mother's womb.

It is Edwards' and Steptoe's goal that their technique become a therapeutic procedure for women who have blocked fallopian tubes, preventing eggs from reaching the uterus to be naturally fertilized. Previously infertile women now have the opportunity to bear children.

According to Caryl Rivers, "Once an ovum can be successfully implanted in the womb, the way is open for 'proxy mothers.' A fertilized ovum could be removed from the womb of a woman after she had conceived and then implanted in the uterus of another woman who would ultimately give birth. The child of course would carry the genetic identify of its true parent. The proxy mother would be only a temporary host with no genetic relationship to the child."[1] A

[1]Caryl Rivers. Genetic engineering portends a grave new world. *Saturday Review*, April 8, 1972, 23-27.

woman who does not want to carry through the nine months of pregnancy can simply contract to pay someone else to bear her child.

This technique could also be a means to insure the desired sex of a child. After fertilization and development of the egg to the blastocyst stage, one could excise a cell and examine the sex chromosomes. If the embryo is of the desired sex it would then be placed in the uterus of the mother or other suitable carrier. This would be significantly important for persons desiring children but fear detrimental consequences because they are carriers of sex-linked diseases such as hemophilia. Genetic diseases could thus be controlled or eradicated.

There are, however, problems attendent to employing test tube or *in vitro* fertilization techniques. They involve manipulating or changing the natural reproductive process, and it is unknown to what degree trauma and permanent damage will be inflicted on the developing egg. In Dr. Edwards' early series of experiments, 56 eggs were inseminated, but only seven were fertilized, and of those, five were abnormal.

Reproduction in the laboratory has presented the question of whether this procedure can still be considered human procreation. Joseph Fletcher holds that "Man is a maker and a selector and a designer, and the more rationally contrived and deliberate anything is, the more human it is. Any attempt to set up an antinomy between natural and biological reproduction on the one hand and artificial or designed reproduction on the other hand is absurd. The real difference is between accidental or random reproduction and rationally willed or chosen reproduction. In either case it will be biologic—according to the nature of the biologic process. If it is 'unnatural' it can be so only in the sense that all medicine is 'unnatural.' It is willed, chosen, purposed, and controlled and surely these are among the traits that distinguish *Homo sapiens* from others in the animal genus, from the primates down . . ."[2]

Dr. Leon Kass, on the other hand, believes that the more the laboratory is involved in reproduction the more it becomes sheer manufacture. He argues that when we try to control the quality of the product we depersonalize the process. On the other hand, the process of procreation involves the communication of love and the desire for children. This is perhaps one of the unique aspects of the human experience. Moreover, Dr. Kass is concerned over the need to preserve the integrity of the family. In today's impersonal world, the family may be the only institution where one is loved, not for what one does, but for what one is. If the family unit is destroyed, he contends, a person would be faced with an even more impersonal prospect.

Questioning whether we can judge wisely, Isaac Asimov, a biochemist and well-known science fiction writer, suggests that we should take an action if we have reason to believe that we can choose wisely. However, he believes that if the choice is between doing nothing and doing without knowing, then we should do nothing. Asimov compares this with changing the environment. When we build a dam, for example, there is a gain and there is a loss. The problems we encounter are due to our tendency to base our decisions on short term benefits without regard for the more long-term consequences.

The ethical concerns of manipulating a child-to-be are explored by Paul Ramsey, professor of religion:

- "My point as an ethicist is that none of these researchers can exclude the possibility that they will do irreparable damage to the child-to-be. And my conclusion is that they cannot morally proceed to their first ostensibly successful achievement of the results they seek, since they cannot assuredly preclude all damage.

- "However much these experimental embryologists may have mimicked nature perfectly, they cannot gurantee that the last artificial procedure they carry out before implantation (or know they cannot carry through, such as karyotyping, which Dr. Steptoe cited when he erroneously spoke of 'bravery'), may be the important one. The last procedure may induce damage (or the last procedure known to be possibly damaging may not be able to be used although it might detect damage induced by previous procedures). Damage could be introduced during the transfer procedure, even after the last inspection is made. The last inspection may induce damage, or it may not be done because it could be fatal or damaging. For all we know, the manipulation may implant embryos that, if abnormal, will not be spontaneously aborted with the same frequency as under natural conditions. Finally, detectable natural abnormalities and detectable induced abnormalities may prove inseparable to such a degree that it will be difficult to establish exactly what are the additional risks due to this procedure. If true, that would be a limit upon experimental designs, even if one had gotten over the earlier objections that it is immoral to use the child-to-be to find out.

- "By the ordinary canons of medical ethics, the unmade child has not 'volunteered' to help the scientist—or even his 'mother.' If the possible future human being can be construed to have 'volunteered,' we would have first to construe him to be there, in being, or at least with a powerful title to be born, willing to suffer some induced risk in order to be manipulated to 'come unto us.' To construe his consent requires not only these manifest absurdities; to do so, to consent in his behalf, would also require that he be already exposed to some risk which these procedures are designed to relieve. For, again by the ordinary canons of medical ethics, we are not permitted to give proxy consent except medically in behalf of someone who may not be in a position to give expressed consent, or to impute to him a will to relieve someone else's condition—in his case 'his' 'mother's' infertility. We ought not to choose for another the hazards he must bear, while choosing at the same time to give him life in which to bear them and to suffer our chosen experimentations. The putative volition of such an unmade child must, anyway, be said to be negative, since researchers who work in human experimentation do not claim that they are allowed to ask volunteers to face possibly suicidal risks or to place themselves at risk of serious deformity."[3]

[2]Joseph Fletcher. Ethical aspects of genetic controls. *New England Journal of Medicine*, September 30, 1971, 781.

[3]Paul Ramsey. Shall we reproduce? *Journal of the American Medical Association*, June 5, 1972, *220* (10), 1347. (Excerpted by permission from the American Medical Association, Copyright 1972)

Reading 2

Test Tube Babies: The Quandaries Of Creation

The birth of the world's first "test tube baby," Louise Brown, on July 25, 1978, in Oldham, England, was a landmark in the history of medical science. As the first successful attempt to bring a human ovum fertilized *in vitro* (outside the body) safely through a full-term pregnancy, the event was a scientific triumph, but it has raised profound moral, ethical, and legal questions.

After Louise Brown's birth, the U.S. Secretary of the Department of Health, Education and Welfare (HEW) directed HEW's Ethics Advisory Board to study the "scientific, ethical, legal, and social aspects of human *in vitro* fertilization and embryo transfer," in order to help HEW make decisions about the conduct and funding of *in vitro* fertilization experiments. The complex issues that the Ethics Advisory Board addressed in its nearly yearlong study of *in virtro* fertilization illustrate the grave problems and decisions with which scientists, prospective subjects, and society in general will be faced as modern medicine gains increasing control over the human reproductive process. The Board recently released its 132-page study of *in vitro* fertilization, entitled *Report and Conclusions: HEW Support of Research Involving Human* In Vitro *Fertilization and Embryo Transfer.*

Although the Board concluded that, provided strict research guidelines are followed, "it is acceptable from an ethical standpoint to undertake research involving human *in vitro* fertilization and embryo transfer," it strongly emphasized the ethical complexity of the issue. The Board's report states, in fact, that "concerns regarding the moral status of the embryo and the potential long-range consequences of this kind of research were among the most difficult that confronted the Board."

The primary goal of *in vitro* fertilization and embryo transfer is to help infertile couples who cannot have children of their own by an other means. Evidence cited by the Board

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suggests that as many as 280,000 American women who could not bear children any other way might be helped by *in vitro* fertilization. But since many fertilized ova do not survive attempts at fertilization and embryo transfer, some people—especially those who feel that life begins at the moment of conception—insist that *in vitro* fertilization is morally insupportable.

The issue rapidly becomes more complex when other uses for *in vitro* fertilization are suggested, such as: developing or testing contraceptives, determining the causes of infertility, looking for certain kinds of cancer, investigating abnormal cell growth, and studying chromosomal abnormalities. Despite the worthiness of these aims, some people who would support research on *in vitro* fertilization to help infertile couples might be less enthusiastic about supporting other kinds of research with human embryos because such research comes uncomfortably close to experimenting with human subjects.

The danger of the abuse of human embryos in *in vitro* research was, in fact, one of the major concerns of some of the scientists who testified before the Board. Although the Board recommended that no embryos should be sustained beyond the stage normally associated with implantation in the uterus (about 14 days after fertilization), critics of research with human embryos feared that some scientists might try to keep an embryo alive all the way to "viability," and thus produce a true "test tube baby." Some speakers before the Board also cautioned that scientists might use human embryos in attempts at altering gene structure, transplanting nuclei from adult humans (cloning), or creating human-animal hybrids. Another problem raised was the status of an apparently grossly abnormal embryo. If *in vitro* fertilization results in the creation of an abnormal embryo, should the embryo be implanted in the mother's uterus as planned, and if it is not, is this not the first step towards deciding which fetuses are genetically worthy of life? Other testimony raised the possibility that *in vitro* fertilization might lead to sperm and ova banks, surrogate mothers, and to strong demands for extramarital use of *in vitro* fertilization and embryo transfer.

The Ethics Advisory Board concluded that "the human embryo is entitled to profound respect: but this does not necessarily encompass the full legal and moral rights attributed to persons." The Board also noted that in the normal human reproductive process, only about 37% of all fertilized ova become implanted in the uterus and survive to birth: so, since human reproduction inevitably involves the destruction of embryos, the loss of some embryos fertilized *in vitro* may not be an ethically unacceptable price to pay.

The issue of *in vitro* fertilization, however, is not strictly one of either social or scientific ethics. The Board also had to confront some thorny legal problems. The government could conceivably ban *in vitro* fertilization research, for example, on the grounds that "the creation, study, and destruction of early human embryos is inconsistent with the dignity which should be accorded to forms of potential human life." But, the Board also noted, "a married couple with no alternative means for having a child of their own could claim that restriction of access to *in vitro* fertilization is interference with the fundamental right of marital privacy and with their right to choose whether, and in what manner, to achieve procreation." Thus, the issue of *in vitro* fertilization involves not only the legal rights of human embryos but the rights of women and couples. In fact, the Board also had to consider the legal status of surrogate mothers (women who carry other women's babies) and single women who might want to take advantage of *in vitro* fertilization.

Assuming the ethical objections to *in vitro* fertilization are over come, abuses of human embryos in the laboratory are controlled, and legal issues are resolved, *in vitro* fertilization could very well be opposed on the grounds that it is money badly spent. Some scientists and thinkers who prepared reports for the Board believe infertility to be a serious problem that contributes greatly to marital instability and even threatens the mental health of many women. Others argue, however, that the importance of biological parentage is overplayed, and that the limited funds available for health care in the U.S. would be better spent on other, more critical concerns, such as health care for the poor or even venereal disease—a major cause of infertility.

After sifting through the mass of information and conflicting opinions, the Ethics Advisory Board eventually concluded that a "broad prohibition of research involving human *in vitro* fertilization is neither justified nor wise." The Board felt that developments such as surrogate mothers and abuses of human embryos in research could probably be controlled, and stated that it could find no ethical objection to the use of federal funds for *in vitro* fertilization research. The Board noted, in fact, that *in vitro* research with human embryos would no doubt continue both in the U.S. and abroad whether the U.S. chose to fund such research or not. And some scientists suggested that federal funding of *in vitro* fertilization research would enable the government to ensure that experiments were carried out safely and with respect for human embryos. The Board also concluded that the National Institute of Child Health and Human Development should work with professional societies and foreign governments to make sure that the latest information on *in vitro* fertilization is collected and made accessible so that both physicians and prospective subjects can be fully informed. The Board's final recommendation was that the Secretary of HEW "should encourage the development of a uniform or model law to clarify the legal status of children born as a result of *in vitro* fertilization."

The array of problems that the Ethics Advisory Board felt compelled to address in its deliberations illustrates the complexity and gravity of the issue of *in vitro* fertilization. The Board's report also shows how new medical knowledge can lead to questions that are not strictly scientific, but ethical, moral, and legal.

Dilemma 11 — BABIES MADE TO ORDER

Dr. James and Dr. Smith recently opened a clinic which uses "test tube baby" procedures to help "infertile" women bear children. Since its beginnings, the clinic has achieved success in its many attempts to implant a laboratory fertilized embryo into the prospective mother. Couples from all over the country and from other countries have sent requests to become patients there. However, because the procedure is technically difficult and requires highly skilled personnel, the clinic will handle only a few patients yearly. The doctors therefore must screen their patients carefully and make sure that the infertility problem cannot be cured in any other way (for example, repair of damaged fallopian tubes).

Mr. and Mrs. Jerrod have come to the doctors for help. They have five daughters and desparately want a son to carry on the family name. They offer to pay well for the services and provide a trust fund to support the research activities at the clinic. Moreover, Mr. Jerrod is on the board of trustees at the medical school where the two doctors hold teaching positions. Mr. Jerrod, therefore, feels that the doctors would want to help him.

If the doctors agree, they may have to destroy fertilized female embryos. Should the doctors conduct the procedure for the Jerrods? Why or why not?

SAMPLE OPINIONS

Wayne

"Sure, if I were the doctor I would want to help the Jerrods. Having a boy is very important to them. I think every father wants a son. If there is a way possible for them to have a son, I don't see why they don't try it. Since Mr. Jerrod is on the board of trustees at their medical shcool, it's even more reason why they should want to help him. Think about what happiness a son will bring to that family!

Also, Mr. Jerrod has offered to set up a trust fund for research at the clinic. The research might lead to safer embryo transfers and even new knowledge about human development. New discoveries in medicine can bring about a healthier society. Every opportunity should be taken for the advancement of science. In the case of embryo transfer medical science has now given people the chance to choose the sex of their children. It's no longer a case of guesswork!"

Fred

"Definitely not! I wonder about the value of the embryo transfer procedure in and of itself. We may have the technology but should we use it? First of all, the developing embryo is exposed to an unnatural situation. One never knows what damage can or will occur unitl the child is born. Sometimes abnormalities don't show up until adulthood. To expose the unborn to unnecessary risks is simply not right. Also, the unborn has absolutely no say in the matter. The parents and doctors have decided for him or her. And what if the fertilized embryo were female? Does a potential human being have rights that should be protected?

I am also afraid that encouraging the use of the embryo transfer technique will reduce human reproduction to the marketplace. We can shop around until we find an embryo that meets all our requirements. What does this say about the value we put on human life? Will we come to a point at which we will allow, for example, only males who will be tall, with blond hair, intelligent and not nearsighted to be born?

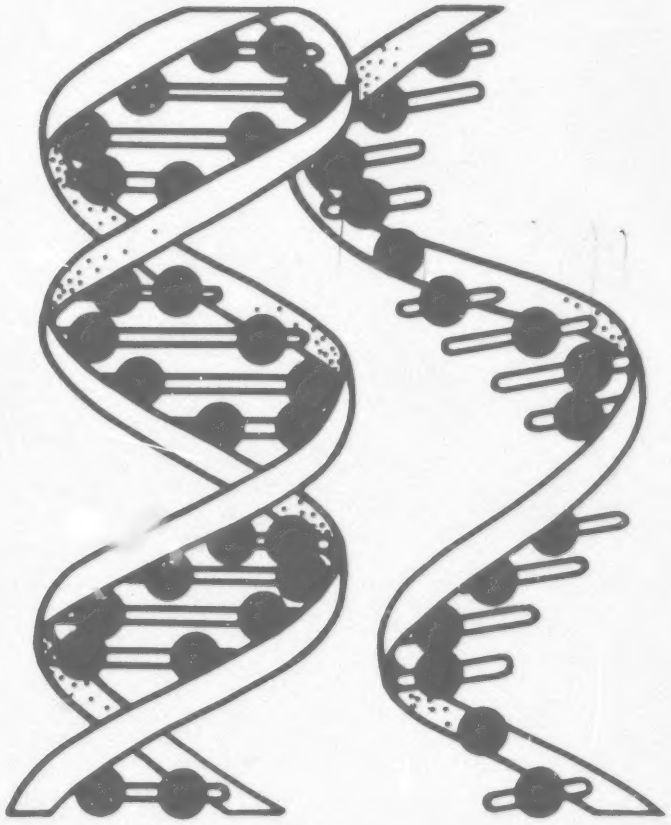
Connie

"No, I think that the doctors should refuse. They will be going against the real purpose of the procedure. The test tube baby technique was developed to help women who before could not bear children. The Jerrods have other children. They are taking advantage of the fact that they have money and influence. In a sense they are using it to bribe the doctors.

The doctors should uphold their duty as doctors. They are healers of the sick. The Jerrods have no medical problem. They just want to satisfy their own whim. I don't believe that the doctors should waste their skills and time. There are many people who really need help. It's really more important for women who have never had children to finally be able to have them. I would guess that these women would not be particular about the sex of the child either. They would probably be happy with a child of either sex.

DISCUSSION QUESTIONS

- Should the offer of a high payment and more research funds be a consideration in the doctor's decision? Why or why not?
- Is the desire for a boy a good enough reason for the Jerrods to request this procedure?
- Would the doctors be right in limiting the use of this procedure only to women who have infertility problems? Why or why not?
- Should the doctors be concerned that they may have to destroy a developing female embryo? Why or why not? Is this the same as an abortion?
- What are some of the risks or dangers surrounding the use of the "test tube baby"/embryo transfer technique?
- Should doctors and parents subject the unborn to the risks of this artifical fertilization procedure?
- In this case is the "unmade" child being used as an experimental subject?
- If the child is born deformed, who should be blamed? The doctors or the parents? Could the parents sue for malpractice?
- Will the widespread use of the embryo transfer technique affect our concept of human life?
- How might human society or the family structure change, if people can decide what characteristics they want in their children? What type of characteristics might people consider undesirable? Will such embryos be destroyed?



Recombinant DNA

Reading

Tinkering With Life

It is one of the lowliest of nature's creatures, a rod-shaped beastie less than a ten-thousandth of an inch long. Its normal habitat is the intestine. Its functions there are still basically unknown. Yet this tiny parcel of protoplasm has now become the center of a stormy controversy that has divided the scientific community, stirred fears—often farfetched—about tampering with nature, and raised the prospect of unprecedented federal and local controls on basic scientific research. Last week the bacterium known to scientists as *Escherichia coli* (*E. coli*, for short) even became a preoccupation at the highest levels of government.

Appearing before a Senate subcommittee on behalf of the Carter Administration, HEW Secretary Joseph Califano asked Congress to impose federal restrictions on recombinant DNA research, a new form of genetic inquiry involving *E. coli*. The urgency of Califano's request underlined the remarkable fact that a longtime dream of science, genetic engineering, is at hand—and, some fear, already out of hand. In laboratories across the nation, scientists are combining segments of *E. coli's* DNA with the DNA of plants, animals and other bacteria. By this process, they may well be creating forms of life different from any that exist on earth.

That this exciting new research holds great promise but could also pose some peril was stressed in the day-long testimony before Senator Edward Kennedy's health subcommittee. Califano called recombinant DNA "a scientific tool of enormous potential." He also warned about possible—though unknown—hazards and concluded: "There is no reasonable alternative to regulation under law." Massachusetts Governor Michael Dukakis, involved in the controversy over genetic-engineering projects at Harvard and M.I.T., argued for the public right to regulate the research. Said he: "Genetic manipulation to create new forms of life places biologists at a threshold similar to that which physicists reached when they first split the atom. I think it is fair to say that the genie is out of the bottle."

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The issue, stated simply, is whether that genie is good or evil. Proponents of this research in DNA—the master molecule of life—are convinced that it can help point the way toward a new promised land—of understanding and perhaps curing cancer and such inherited diseases as diabetes and hemophilia; of inexpensive new vaccines; of plants that draw their nitrogen directly from the air rather than from costly fertilizers; of a vastly improved knowledge of the genetics of all plants and animals, including eventually even humans (TIME special section, April 19, 1971).

Opponents of the new research acknowledge its likely bounty, but fear that those benefits might be outweighed by unforeseeable risks. What would happen, they ask, if by accident or design, one variety of re-engineered *E. coli* proved dangerous? By escaping from the lab and multiplying, their scenario goes, it could find its way into human intestines and cause baffling diseases. Beyond any immediate danger, others say, there are vast unknowns and moral implications. Do not intervene in evolution, they warn in effect, because "it's not nice to fool Mother Nature." Caltech's biology chairman, Robert Sinsheimer, concludes: "Biologists have become, without wanting it, the custodians of great and terrible power. It is idle to pretend otherwise."

The scientific community is bitterly divided about the unknown risks of genetic engineering. The wrangling has been public, and traditional scientific courtesy has all but vanished. Infuriated by unreasoning opposition to the new discoveries, James Watson—who, with Francis Crick, won a Nobel Prize for determining the double-helix structure of the DNA (for deoxyribonucleic acid) molecule—has labeled the critics "kooks," "shits" and "incompetents." One of his targets is fellow Nobel Laureate George Wald, who has supported efforts to ban recombinant DNA research at Harvard and M.I.T. Wald contends that instead of trying to find the roots of cancer, for example, through genetic research, society can fight the disease more effectively by taking carcinogens out of the environment.

The concern of Caltech's Sinsheimer is partly philosophical—some might even say mystical. He fears the unpredictable consequences of breaching what he calls nature's "evolutionary barrier" between different kinds of creatures—the genetic incompatibility that in most cases prevents one species from breeding with another. In the same vein, retired Columbia Biochemist Erwin Chargaff asks: "Have we the right to counteract, irreversibly, the evolutionary wisdom of millions of years in order to satisfy the ambition and the curiosity of a few scientists?"

For every salvo from the critics, though, a return round comes from defenders of recombinant DNA research. Bernard Davis, a Harvard Medical School microbiologist, is so sure the new technique is safe that he has publicly offered to drink recombinant DNA. He insists that those who worry about infections are totally ignorant of medicine's long history of safely handling highly contagious bacteria and viruses. Nor, he says, do they understand how difficult it is for a microbe to become pathogenic. He adds: "Those who claim we are letting loose an Andromeda strain are either hysterics or are trying to wreck a whole new field of research." Less acerbically, Chemist John Abelson pointed out in last week's *Science* that in five years of work with recombinant DNA there has not been a single reported case of infection. The evidence so far suggests that virulent combinations of genes are highly unlikely; the host bacteria simply reject the unwanted genes or die. "Thus," he concludes, "it is probably not possible to create a strain that would overgrow the laboratory and head for town, as depicted in movies of the 1950s."

Brushing off Chargaff's fears of violating "evolutionary wisdom," Molecular Biologist Stanley Cohen, at the Stanford University School of Medicine, notes that man has been intervening in the natural order for centuries—by breeding animals and cultivating hybrid plants and, more recently, by the use of vaccines and antibiotics. With undisguised sarcasm, Cohen adds that it was Chargaff's "evolutionary wisdom that gave us the gene combinations for bubonic plague, smallpox, yellow fever, typhoid, polio and cancer."

The DNA furor has already intruded on the free exchange of information so vital to scientists. Longtime associates are no longer talking to each other. Fearful of losing out on tenure or research grants by taking the "wrong" stand on the issue, some junior researchers are lapsing into monklike silence. At Harvard, at least one graduate student has been disowned by her thesis adviser for getting into the fray. Says Microbiologist Richard Goldstein of the Harvard Medical School: "The level of animosity is unbelievable. There have been character assassinations left and right." Sometimes the argument has sounded like a replay of old Vietnik protests. At a forum of the National Academy of Sciences in Washington last month, unruly opponents of genetic research, chanting "We shall not be cloned," took over the stage and unfurled a banner reading: *WE WILL CREATE THE PERFECT RACE—ADOLF HITLER.*

Scientists clearly do not have any diabolical intent, but their emotional and unusually public debate over DNA has made ordinary citizens sit up and take notice. Newspaper and magazine articles have carried such chilling headlines as: *NEW STRAINS OF LIFE—OR DEATH, SCIENCE THAT FRIGHTENS SCIENTISTS and MAN-MADE BACTERIA COULD RAVAGE EARTH.* The Public Broadcasting Service (PBS) produced a special hour-long show, "The Gene Engineers," for its Nova series. Taking the genetics fuss as his cue, Columnist Russel Baker recently wrote of a plan by depilatory makers to combine the genes of man and ape. Their goal: to produce more hirsute customers.

Art Buchwald also got into the act. He described a visit to a futuristic "people" lab, where he asks the white-coated salesman if there have been any accidents. Yes, the salesman replies. "Someone once accidentally mixed the genes of Jack the Ripper with a donkey . . ." "What was the result?" "We reproduced Idi Amin." Hollywood, too, is aware of the box office value of converting re-engineered cells into celluloid. In the new film *Demon Seed,* a scientist's wife (Julie Christie) is "ravished" by his super-smart computer, which somehow manages to combine its "genes" with hers. The fruit of that union: an offspring that appears at first to be—well, a miniature knight in armor.

Science is not interested in pursuing such bizarre fantasies; the real advances are exciting enough. About five years ago, California scientists learned how to combine genes from different organisms, regardless of how low or high they are on the evolutionary scale. Though the researchers added only one or two new genes to a bacterium's collection of thousands of genes, the creation of such hybrid molecules was a stunning feat. The accomplishment seemed to breach one of nature's more inviolable barriers. Even primates as closely related as gorilla and man are so different genetically that they cannot produce offspring. Thus it was not size alone that made King Kong and his ladylove a mismatch. The real

species barrier is in the genes.

Molecular biology's wizards have managed to cross the obstacle in their work with bacteria. Unlike higher organisms, bacteria are single-celled creatures that usually reproduce not by sexual mating but by simply dividing. Thus their ability to acquire new and possibly advantageous genes would seem to be highly limited. But the tiny creatures have devised a cunning alternative. Besides their single, large, ringed chromosome (which is the repository of most of their genes), they possess much smaller closed loops of DNA, called plasmids—which consist of only a few genes. This extra bit of DNA—genetic small change, as it has been dubbed—serves a highly useful purpose. When two bacteria brush against each other, they sometimes form a connecting bridge. During such a "conjugation," a plasmid from one bacterium may be passed into the other.

These natural transfers can be crucial to the survival of the bacterium. It is through new plasmids, for example, that bacteria like *Staphylococcus aureus* have become resistant to penicillin. The plasmid acquired by the staph bug contained a gene that directs the production of a penicillinase, an enzyme that cracks apart invading penicillin molecules, making them ineffective. Different plasmids, sometimes passed from one bacterium to another, can order up still another kind of chemical weapon, a so-called restriction enzyme, which can sever the DNA of an invading virus, say, at a predetermined point.

Observing these bacterial tricks, molecular biologists began isolating various restriction enzymes. They had already discovered another type of bacterial enzyme, called a ligase (from the Latin word meaning to bind), which acted as a form of genetic glue that could reattach severed snatches of DNA. Using their new biochemical tools, the scientists embarked upon some remarkable experiments. As usual, they turned to their favorite guinea pig, a lab strain of *E. coli*, and soon they had learned to insert with exquisite precision new genetic material from other, widely differing organisms into the bacteria.

E. coli did not merely accept the hybrid plasmids. When the bacteria reproduced—by dividing and thus doubling—at a rate of about once every 30 minutes, they created carbon copies of themselves, new plasmids and all. In only a day, one bacterium could make billions of duplicates of a transplanted gene.

The tremendous potential of these recombination techniques was not lost on the scientists. They reasoned that if the appropriate genes could be successfully inserted into *E. coli*, they could turn the bacteria into miniature pharmaceutical factories. The tiny creatures could churn out great quantities of insulin for diabetics (now obtained from the pancreases of pigs and other animals), clotting factor for hemophiliacs (currently both scarce and expensive), vitamins and antibiotics.

Re-engineered bacteria could have many other tasks. Scientists are already considering creation of special nitrogen-fixing bacteria, which would live in roots of crops that now do not have them, thus making it unnecessary to fertilize fields. A General Electric researcher has already added plasmids to create an experimental bug that produces enzymes capable of degrading a wide range of hydrocarbons; an organism engineered by recombinant DNA might some day be used to clean up oil spills. (Even this scheme alarms some opponents of the new research. They fear that a bug designed to gobble up oil spills might get into a pipeline or the fuel tanks of a jet in flight. Jokes one observer: "Some day you may have to worry about your car being infected.")

Most important, recombinant techniques are of enormous help to scientists in mapping the positions of genes and learning their fundamental nature. Stanley Falkow, a University of Washington microbiologist, recently used the method to isolate two toxin-producing bacterial genes that cause diarrhea in humans and livestock. This discovery may lead, in time, to a vaccine against the disorder. But far greater biological bonanzas are in the offing. After three decades of intense study, only one-third of *E. coli's* 3,000 to 4,000 separate genes have been identified. Higher organisms are much more complex. Humans, for example, have hundreds of thousands of genes. Trying to find out what each of them does has stymied scientists. But if human genes could be transplanted, one at a time, into *E. coli* and replicated in wholesale amounts, researchers would for the first time have great enough quantities of genes and their products to analyze them fully. Eventually, the genes on all 46 human chromosomes could be precisely located and studied. Not the least of the benefits might be a vastly increased understanding of the molecular basis of disease—especially cancer, which seems to occur when the cell's genetic machinery goes awry.

No one has given more thought to Andromeda-strain scenarios than the scientists who most strongly support the new research. Indeed, it was their own caution that first brought these possibilities before the public. In the summer of 1971, while lecturing on the safe handling of cancer viruses at James Watson's Cold Spring Harbor Laboratory on Long Island, a young cancer researcher named Robert Pollack learned from a visiting scientist that her boss at Stanford Medical Center planned a novel experiment. He hoped to insert a monkey virus, SV40, into *E. coli*. Although the virus seems harmless enough in its original hosts, it can cause tumors when injected into lab animals: it also turns laboratory cultures of human cells cancerous, although there is no evidence that it can cause cancer in people.

Highly concerned about the uncertainties of infecting laboratory bacteria similar to those in man with known cancer genes, Pollack immediately called Stanford and raised his doubts. The experimenter, Biochemist Paul Berg, listened politely but saw no reason for alarm. He knew that SV40 had been handled without ill effects by countless laboratory workers and had even been inadvertently included in some of the first batches of oral polio vaccine without doing any apparent harm. Indeed, Berg felt that the experiment was not only safe but extremely important. SV40's appeal lies in the fact that it has only a few genes, one of which apparently has the ability to turn normal cells into cancerous ones. If anyone could unlock the mysteries of this lethal gene—a goal of laboratories around the world (and the kind of discovery that might well win a Nobel Prize)—one would have taken a major step toward understanding the elusive mechanism of cancer.

When Berg asked his colleagues about the experiment, some of them also expressed misgivings. What if an altered *E. coli*, carrying SV40 genes, planted a slow-ticking cancer time bomb in the human gut? Nagged by such questions, Berg canceled his experiment. But even while Berg was agonizing over the decision, scientists made two dramatic discoveries that would vastly simplify recombinant work.

At the University of California at San Francisco, Herbert Boyer and his colleagues found an exceptional new cutting enzyme. Unlike available restriction enzymes, it did not break apart the twin-stranded DNA with a simple slice. Instead, it

caused an overlapping, mortise-type break that automatically left a bit of "sticky" single-stranded DNA at each end, to which new material could be readily attached. Previously, Berg and others who worked in the field had to create such sticky tails synthetically.

The other breakthrough came when Stanley Cohen and his team, working in a Stanford lab two floors below Berg's, found a remarkable plasmid, which was promptly dubbed pSC (Cohen's initials) 101. It had the uncanny ability to take on a new gene and to slip into *E. coli*. Word of Cohen's miraculous little gene conveyor spread rapidly, and experimenters from all over the world besieged him for samples. Usually, scientists are more than willing to oblige such requests. But because pSC101, in conjunction with Boyer's new enzymatic scalpel, made the creation of novel gene combinations so easy, Cohen was hesitant about distributing the material.

Up to this point, little news of these developments had passed outside the tightly knit community of molecular biologists. Any reports that did appear were in scientific journals, in a language virtually incomprehensible to laymen. But as molecular biologists scrambled to isolate other useful plasmids and enzymes for recombinant work, it became increasingly clear to Berg, Cohen and others that the emerging science needed some controls—at least until the risks, if any, were explored. Nowhere was this more apparent than at a private meeting of some 140 leading molecular biologists in New Hampshire during the summer of 1973. When Cohen described his latest work, the scientists were electrified. As the meeting's co-chairman, Maxine Singer, a DNA specialist at the National Institutes of Health (NIH) recalls: "Here was someone talking about putting any two kinds of DNA together." Before the meeting broke up, the scientists voted to ask the National Academy of Sciences to examine the new technique for risks. They also agreed to voice their concern in a public letter to *Science*, the foremost U.S. science journal.

The academy bounced the problem right back to the molecular biologists by forming an investigatory committee and choosing Berg as its head. As far as Berg and Cohen were concerned, the action came none too soon. Some of the requests for plasmids had been sent by scientists planning precisely the same type of tumor virus implant that Berg had voluntarily forsworn two years earlier. "I was really shocked," Berg recalls. At a meeting of his special committee at M.I.T. in April 1974, the other members promptly agreed to a highly unusual move. They asked all researchers to honor a temporary ban on certain types of recombinant DNA experiments deemed potentially the most dangerous: Those involving animal tumor viruses, and those increasing drug resistance or toxicity in bacteria. This time they published their appeal in both *Science* and the British journal *Nature*. Not since 1939—when a handful of physicists asked their colleagues to stop publishing atomic data to prevent the information from falling into German hands—had scientists tried such self-policing.

The moratorium, however, was only a stopgap. In February 1975, at Berg's invitation, 134 scientists, including many leading molecular biologists, plus a handful of lawyers and 18 interested reporters, assembled at the picturesque Asilomar retreat among the pines and redwoods of California's Monterey Peninsula. The serenity of the setting was shattered by four lawyers, led by Daniel Singer, Maxine's husband, who lectured the scientists on their legal responsibilities. If an accident did occur during recombinant work, they pointed out, a technician might sue the lab chief. And if a dangerous bug escaped and infected people outside, the lawyers warned, the situation could turn into a legal—to say nothing of a medical—disaster.

The calculated shock treatment worked. Toiling through the night, Berg and his committee drafted recommendations that the conferees readily accepted before their departure the next day. They voted not only to continue the ban on the worrisome experiments, but also to press NIH to establish levels of safety that should be required for different experiments. In addition, they decided that precautions to keep research organisms from escaping from laboratories had to include "biological containment." This required the creation of mutated strains of *E. coli* so disabled that they could live nowhere but in a test tube. If they did escape their special broth and enter the atmosphere—or human gut—they would die almost instantly. Although the scientists left Asilomar thinking that they had allayed public fear about their work, they had only managed to fan it. Newspapers, which had until then paid scant attention to the story of recombinant DNA, erupted with scare headlines, alarming the nation with exaggerated doomsday prophecies. Two months later, Ted Kennedy held his first hearings on the new genetics. Some scientists, joined by politicians, began questioning whether the molecular biologists should do their own policing. Said one: "This is probably the first time in history that the incendiaries formed their own fire brigade."

The gibe seemed aimed particularly at another Stanford scientist, David Hogness, who was leading the way in a new form of genetic roulette, appropriately called "shotgun" experiments. Hogness was using enzymes to fragment the DNA of fruit flies and then was inserting the gene material piecemeal into bacteria. That way he could reproduce the inserted genes in vast quantities and discover their functions. The technique seems to be working. To date, he has managed to isolate and identify 36 of the thousands of the fruit fly's genes. But critics fear that because the nature of many of the genes is totally unknown beforehand, the host bacteria might be endowed with some dangerous new characteristic. What irritated the opponents of recombinant DNA even more was the fact that Hogness was in charge of a subcommitte appointed by the National Institutes of Health to draft the guidelines. That, said M.I.T.'s Jonathan King, leading member of the radical Science for the People organization, was like "having the chairman of General Motors write the specifications for safety belts."

Despite the sniping, the NIH group by last summer managed to turn Asilomar's directive into concrete rules. The guidelines continue the ban against the potentially most dangerous experiments. They also provide two principal lines of defense against lesser hypothetical risks. They establish four levels of physical containment; these range from standard laboratory precautions (dubbed "P-1") for experiments in the lowest-risk category—say, injecting harmless bacterial genes into *E. coli*—to ultra-secure laboratories ("P-4") for work with animal tumor viruses or primate cells. At present, two new P-4 facilities are almost ready. One is a gleaming white trailer parked behind a barbed-wire fence on the grounds of the National Institutes of Health in Bethesda, Md. It has a totally sealed environment, airlocks, decontamination systems, showers for workers after experiments, and sealed cabinets accessible only through attached gloves. Some "worst case" experiments, involving animal tumor viruses, will begin in the trailer this summer. NIH is also converting

some of the abandoned germ-warfare labs at Maryland's Fort Detrick into similar super-containment facilities. In addition to the labs, the guidelines require the use of the self-destructing, escape-proof microbes for certain higher-risk experiments.

Most researchers, eager to continue their work in cracking various genetic riddles, welcomed the guidelines. Numerous universities across the country had already begun work on new P-3 labs, which have a lower and less costly level of containment (air locks, limited access, safety cabinets with curtains of flowing air) than P-4 facilities. Not everyone, though, was pleased.

Egged on by Wald and his biologist wife, Ruth Hubbard, Cambridge's Mayor Alfred Velluci used the escalating DNA furor to badger his old foe, Harvard. He convened the city council in an effort to halt DNA research at the school. Said Velluci: "Something could crawl out of the laboratory, such as a Frankenstein." At the council's request, Harvard and M.I.T. agreed to a moratorium on P-3 research while an eight-member citizens' review board studied the issue. In February, the council overrode Velluci and passed an ordinance permitting recombinant DNA work to be resumed in Cambridge—under standards only slightly more strict than the NIH guidelines.

Most scientists breathed a sigh of relief; the specter of local governments proclaiming a hodgepodge of crippling restrictions on the freedom of inquiry had faded—at least temporarily. Local politicians now may go along with the impending federal legislation, which is expected to impose restraints on all researchers—including those at previously unregulated industry labs. Still, scientists remain concerned over any political controls on their work. At last week's Senate hearing, these fears were voiced by Norton Zinder, a molecular geneticist at Rockefeller University. Said he: "We are moving into a precedent-making area —the regulation of an area of scientific research—and I must plead that this be done with extreme care and without haste. The record of past attempts of authoritative bodies, either church or state, to control intellectual thought and work have led to some of the sorriest chapters in human history."

Zinder has reason for worry. But he and other scientists should find reassurance in the experience of Cambridge. There, citizens patiently ignored political demagoguery, perceived the false notes in the voices of doom, mastered the complex issues and then cast their votes for the continuation—with reasonable restraints—of free scientific inquiry. Congress should do no less.

Making a Safer Microbe

Laboratories can be designed to prevent the escape of potentially dangerous organisms. But there is always the chance that something or someone will fail—and that a few virulent bugs will slip through the safeguards to multiply in the outside world. Faced with this problem at the Asilomar conference, Geneticist Roy Curtiss III proposed an ingenious solution: Why not convert the standard genetic research organism, a strain of the *E. coli* bacterium, into a seriously weakened mutant variety that would quickly self-destruct if it escaped the laboratory? Curtiss volunteered to engineer the new bug, and his colleagues agreed to hold off on many of their recombinant DNA experiments until they could be supplied with it.

Returning to his laboratory at the University of Alabama Medical Center in Birmingham, Curtiss quickly hit on a way to keep *E. coli* under control. The microbes must be able to manufacture a protective membrane; without such an outer coat they would swell and burst during normal growth. To keep them from manufacturing a complete coat, Curtiss created an *E. coli* with a defect in a gene that makes diaminopimelic acid (DAP), an important ingredient of the membrane. The defect made the bugs dependent for their survival upon DAP supplied by scientists.

Unfortunately, the defect proved insufficient. Some of the descendants of the new microbe mutated naturally and began manufacturing their own DAP. So Curtiss went a step further and deleted another gene involved in DAP production. These newly designed bugs remained DAPless. But more frustration awaited Curtiss: the mutants managed to survive and multiply even without DAP. How? Dennis Pereira, a graduate student who worked with Curtiss on the project, discovered that they were producing a sticky substance called colanic acid that held them together in the absence of their normal outer coat. By manipulating still another of the microbe's genes, Curtiss and Pereira deprived the bug of its ability to make colanic acid. That change provided an unexpected dividend; it also made the already sickly microbe extremely sensitive to ultraviolet light. Any exposure to sunlight would kill it.

After a few more genetic refinements, Curtiss had developed what seemed to be a safe research bacterium. But a major problem remained. Even dying *E. coli* bacteria can conjugate with healthy ones, transferring their possibly dangerous genetic material in the process. Thus an escaped and dying bug might still pose a danger. Again Curtiss worked his genetic magic, this time taking away from the microbe the ability to produce the chemical thymine, which is a component of the bug's own DNA. Without thymine supplied in the lab, the *E. coli* could not pass its genes on to healthy outsiders.

Curtiss is still working to develop a more perfect—or defective—microbe for recombinant DNA research. But for the time being, genetic engineers have available a tailor-made microbe that cannot survive outside the laboratory and that cannot colonize or even live in the human intestinal tract. Nor is this the only indication that the bug would make a poor pathogen, or disease organism. Curtiss' handmade microbe will not survive in human serum—including that of cancer patients. It is also easily destroyed by common household detergents.

Curtiss named his transmuted bug *E. coli* x1776—in honor of the Bicentennial. In November 1976, the NIH certified it for use in genetic engineering experiments, removing one of the major obstacles to resuming recombinant DNA research.

Dilemma 12 — A NEW CURE FROM REDESIGNED DNA

Dr. Miller, a medical researcher, was attempting to discover a cure for a fatal inherited disease. Based on the research of other scientists he knew that the disorder was caused by a specific chemical deficiency. This deficiency was due to the inability of a gene to direct the synthesis of the enzyme.

The doctor's experimental procedure was being tested using mouse DNA. One critical experiment involved the isolation and purification of selected portions of healthy mouse DNA. In a later experiment the pure DNA from healthy mice is then inserted into the chromosome of a diseased mouse. If the experiment is successful, the enzyme deficiency will disapperar.

Unfortunately, the purified mouse DNA often contains a strain of virus. This virus exists on the animal's DNA and is present in every cell in its body. These DNA fragments can also, in some circumstances, cause disease (usually leukemia). Just two months before, the federal government issued a set of guidelines which restricted the use of this purified DNA to special, carefully constructed laboratories.

Dr. Miller was aware of the new guidelines and was also aware that his laboratory did not meet all the requirments of the guidelines. Nevertheless, he wanted to proceed with the critical experiment needed to perfect his cure.

Should Dr. Miller ignore the guidelines in order to perfect his cure which has the potential to save many human lives? Why or why not?

SAMPLE OPINIONS

Tracy

"Dr. Miller should not conduct the experiment. He should know better than to risk the health and welfare of those around him. His colleagues, especially the technicians who work under his direction, trust him. They expect him to make sure lab conditions were safe. He will betray their trust by conducting the experiment.

Dr. Miller should recognize the importance of the guidelines for protecting himself and his co-workers. He shouldn't have been thinking about his own success and glory but rather of the safety and well-being of his friends and colleagues.

If Dr. Miller only puts himself in the place of one of his technicians for a minute, he would never conduct the experiment. These men and women have families who depend on them and care about what happens to them."

Walt

"I can see Dr. Miller's point. He is so very close to discovering the cure and needs to do one last important experiment. In a sense it's urgent that he completes the research. Everything that he did before will be useless if he doesn't follow through with those planned experiments. How can you expect Dr. Miller to throw everything out the window because of the new guidelines?

To find a cure is the important driving force for any medical researcher. That is the main reason for their long, tedious labors. Dr. Miller is following his duty and responsibilities as a medical doctor—to relieve suffering from illness. I would think that he has had long experience with working with the mouse DNA and never had any problems. He doesn't intentionally want his fellow workers to get sick. Perhaps sometimes one has to take an unknown step in order to make new discoveries. One can't always control all the possible dangers in an experiment. I often hear on the news reports of lab accidents; they aren't unusual."

Donna

"Yes, I think Dr. Miller had good reason for wanting to complete the series of experiments. The discovery of a cure will be a major contribution to medical progress. He's probably most concerned about the benefits we will all gain from the results. Ultimately, many lives can be saved if a cure is perfected. He is working for society's benefit.

I might ask whether the guidelines in this situation were too arbitrary. Would they restrict the progress of medical science? Shouldn't guidelines respect the judgment of the doctors who are doing the work? A good researcher would not willfully expose himself or his assistants to unnecessary dangers. It might be possible for an accident to occur even under the strict safety conditions.

One has to weigh the possible results of the experiment. It becomes a question of how much good will come of it."

DISCUSSION QUESTIONS

- If you were in Dr. Miller's situation, would you carry out the critical experiment? Why or why not?
- Should the federal government have the duty to regulate the types of research to be conducted? Why or why not?
- If the benefits of Dr. Miller's research are so important to society, would you condone the risks he takes? Why or why not?
- If Dr. Miller contracts a tumor, how do you suppose he might feel about his decision to conduct the experiment? Why?
- How much control should government have on scientific research?
- Should scientists be the best judges of what research they undertake? Why or why not? Would they know more about the research than a government agency?
- Do scientists have the right to ignore research guidelines in order to proceed with their work? Why or why not?
- What responsibilities does Dr. Miller have towards the people who work in his lab? In what way can he protect them against possible dangers?

Student Activity

Guidelines for Medical/Scientific Research and Use of New Technology

During the preceding discussions, you encountered situations created by new scientific knowledge and technological developments. In some cases, these situations have caused much public discord because society has not had previous experience in dealing with them. One reason is because there are no widely agreed upon standards or regulations to guide the activity. As a result, many cases have had to be settled by the courts because laws do not clearly cover the new situations or else the law is antiquated.

For example, two medical researchers were brought to trial because they conducted research on aborted fetuses. Here they were accused under an 18th Century statute of "grave robbing." While the accusation may seem facetious, the underlying question is, "Should research on aborted fetuses by allowed?" Related to this is another question, "What types of research should be permitted and who should make that determination?"

In this activity you will have an opportunity to offer some of your ideas by developing a set of guidelines to govern an area of new research or the use of a newly developed cure. Some of the many possible topics are listed below. There may be other topics you wish to add.

- Use of human subjects in experiments
- Research on the newborn
- Genetic screening
- Genetic engineering
- Treatment to prolong the life of the dying
- Tissue and organ transplantation
- Selection of patients to use a machine not widely available
- *In vitro* fertilization
- Testing safety of new drugs

The guidelines may be written from a variety of perspectives, such as from the perspective of hospital policy, government regulations, citizen groups or an organization of scientists.

The guidelines need not be elaborate and can simply be a series of short statements. However, they should indicate that you have given some thought to the topic and considered how the guidelines affect the people involved, the progress of scientific knowledge, and society at large. Will your guidelines protect the rights of the individual as well as the general public? Will your guidelines treat everyone fairly?

The guidelines may be written as an individual assignment or as a group assignment. If the guidelines are to be written as a group, each group member may wish to select one specific section to develop. In developing guidelines as a group, it is important to first discuss the topic thoroughly, highlight the problems in the area, and come to some general consensus about your major concerns.

For example, if guidelines are to be written for *The Use of Human Subjects for Experiments*, you may wish to consider the following points:

1. What types of research should be permitted? Not permitted?

- How can risk to subjects be avoided or minimized?
- How does one define "risk"?
- Should risks be taken if the experimental results will greatly benefit future patients?
- Is there a difference between an experiment and trying out a new treatment? E.g., Are heart transplantations experimental?

2. How should subjects be obtained?

- It is often very difficult to get volunteers. How can one get volunteers without coercion?
- Is offering payment a form of coercion? Are the poor, in this case, at a disadvantage?
- Can children, prisoners, soldiers, dying patients, or the mentally retarded be considered for experiments?

3. What should "consenting" to be a subject in an experiment mean?

- Does a subject need to know all the details about the experiment? What if giving too much information changes the results of the experiment? (E.g., Some people would say they feel better after taking a pill when they do not know the "pill" is a sugar tablet.)
- Does a subject need to know how and who will use the information?
- Can the results of the experiment be used for other purposes? (E.g., Given to one's employer? For government statistics?)
- How can the privacy of the subject be protected? (What might happen if some rare genetic disease were detected and the researchers wanted to study other members of the family and publish the results?)
- Do parents have a right to give permission for their children to participate in an experiment?

4. Who will be responsible for determining whether the guidelines are followed?

- The researchers themselves?
- The head of the lab or hospital?
- A government agency? (Will one have to get permission from that agency every time one conducts an experiment? What effects will that have on research? The protection of subjects?)

5. Who will be responsible if the experiments bring about undesirable side effects?

- The subjects themselves because they consented to the experiment?
- The researchers?
- The doctor who recommended the patient to try an experimental drug?

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Glossary

aberration — deviation from a normal course

air embolism — obstruction of a blood vessel by a foreign substance. In this case, air is blocking the blood flow through a blood vessel.

anomaly — an irregularity, generally referring to a variation that exceeds normal ranges of fluctuation.

anti—arrhythmic drug — a drug which corrects an irregular heart beat.

antibody — a substance produced by the body which reacts with specific foreign materials (antigens). The reaction between antigen and antibody may be helpful as in a response to a germ after receiving a vaccine or harmful as in the reaction to an organ transplant.

anti-coagulant — a chemical which inhibits the clotting of blood.

antigen — any substance which when taken into the body causes the production of antibodies. A vaccine or tissue from another person contains antigens.

artificial insemination — introduction of semen into the vagina by artificial means for the purpose of impregnating the female.

Ashkenazie Jews — Jews of Eastern European origin

asthma — a spasm of the bronchial tubes generally accompanied by swelling of their mucous membrane. Difficulty in breathing, tightness of the chest, and coughing attacks, accompanied by a wheezing, is characteristic of this condition.

autosomal — referring to those chromosomes which are not sex chromosomes. Humans have 22 pairs of autosomes.

bacterium — a single-cell, microscopic organism.

biochemical — referring to the chemical reactions that take place in living organisms.

blastocyst stage — a very early stage of the developing mammalian embryo. Part of the blastocytic stage occurs before attachment within the mother's uterus. The cells at this stage are undifferentiated.

bone marrow aspiration — removal of a small amount of bone marrow (soft tissue in the center of long bones) for microscopic examination.

bronchodialator — a drug which increases the width of the bronchial tubes. Frequently used in the treatment of respiratory congestion and asthmatic conditions.

buffered saline — a salt solution (0.9% normal saline) with a substance that helps to maintain the acid or basic nature of the solution when an acid or alkali is added.

cadaver — a dead body, referring particularly to one used in dissections.

cannulation — the process of inserting a tube to divert the flow of substances.

CNS anomalies — an anatomical disorder of the central nervous system.

cerebral hemorrhage — bleeding within the brain, usually as a result of a diseased or ruptured blood vessel. Often associated with hypertension.

cerebrovascular — referring to the blood vessels of the brain.

cerebrum — the largest uppermost portion of the brain. It is most important in mental activities.

chemotherapy — the use of chemical agents (drugs) in the treatment of disease.

chromosome — microscopic, rod-shaped bodies within a cell which contain the genes of hereditary determination. They occur in pairs.

chromotography — a process of separating a solution of chemicals based on the differences in the rates each of the chemicals are absorbed by the subtance used (e.g., paper, clay, gas, gel, etc.).

cosmogony — theory of the creation or origin of the universe.

cystic fibrosis — an inherited disease of the exocrine glands (glands of external secretion; for example, the mucous glands). The condition usually begins in infancy and is typified by chronic respiratory infection, susceptibility to heat and inability of the pancreas to function normally.

dehydration — an inadequate amount of water in the body's tissue; abnormal loss of body fluids.

delusions — false beliefs

diabetes — a disease which is usually hereditary, characterized by a varying degree of inability to utilize sugar. The carbohydrate intolerance is due to an insufficient amount of insulin production.

Down's syndrome — preferred term for mongolism. Refer to mongolism.

ectopic — implantation of the fertilized ovum outside of the uterine cavity. Generally an octopic pregnancy occurs in the fallopian tube, but may occur in the abdominal cavity or ovary.

egocentric — concern mainly with one's own needs and activities; self-centered.

electrophoresis — the movement of charged particles suspended within a liquid while under the influence of an applied electric field. An important technique employed in biology and medicine to identify and study body fluids.

embryology — the branch of biology which studies the earliest stages of growth.

empirical — pertaining to or based on experience.

endocrine — related to the internal glands of secretion. The internal secretions (hormones) circulate in the blood stream to effect or control many body functions. Some of the endocrine glands are the pituitary, thyroid, gonads and the islet of Langerhans.

epinephrine — the technical term for adrenalin. Adrenalin is a hormone which stimulates our readiness for fight or flight under a stressful condition. It is also used in the treatment of certain medical conditions such as shock and asthma.

esophageal atresis — the esophagus is a tube-like structure which goes from the throat to the stomach. In esophageal atresia there is a pathological closure or congenital absence of that structure.

eugenics — the science of genetic improvement of the human race.

exobiology — the study of living organisms outside of earth.

fetus — an unborn or unhatched vertebrate; in humans it refers to the unborn after the third month of development.

genotype — the full set of genes carried by an individual; the particular set of genes present in an organism.

gestation — referring to pregnancy; development of unborn.

hallucinatory — a false perception having no relationship to reality and not accounted for by external stimuli.

hematologic — referring to that which originates from the blood.

hemodialysis — a method of purifying the blood of patients whose kidneys are malfunctioning.

hemoglobinapathies — referring to a hereditary disease of the hemoglobin. Hemoglobin are protein molecules occurring in red blood cells that carry oxygen and carbon dioxide.

hemophilia — an inherited disease of males characterized by the delay in blood clotting. Even slight injuries such as a bruise can have serious consequences for people with this sex-linked disease.

heterozygous — an organism in which a pair of alleles (one of a group of alternative genes occupying a given area (locus) on a chromosome) for a given trait consists of different kinds of genes. For example, an organism that has both a dominant and recessive gene for eye color is heterozygous for that trait.

hexaminodase A — an enzyme commonly referred to as "hex A." Hex A is required to regulate a certain fatty substance called sphengolipid within the central nervous system. The absence of this enzyme causes Tay-Sachs disease.

homozygote — an organism in which the pair of alleles for a given trait consists of the same kind of genes.

hydrocephalus — an accumulation of cerebrospinal fluid in the ventricles of the brain due to the inadequate absorption within the ventricular system. The increase in fluid pressure leads to such symptoms as increase in cranial size, a disproportionally small face and mental retardation if the condition is not surgically corrected.

hypervitaminosis — an abnormal condition caused by excess vitamin intake of one or more vitamins. This occurs more frequently with vitamin A or D.

hypoglycemic — refers to less than normal blood sugar.

hypotension — blood pressure which is below normal.

hysterotomy — an incision into the uterus commonly referred to as a ceasarean section. A hysterotomy is sometimes performed to abort a later term fetus.

iatrogenic disease — disease brought about inadvertently by a physician or the treatment.

immune reaction — the body's reaction to foreign substance. It is a major defense mechanism against disease but also acts in an adverse way such as in allergic reactions or rejection of organ transplants.

immunosuppressive — a drug, substance, or disease which suppresses the body's immune mechanism.

in situ — in the natural or original position

internal ileac — an artery that supplies the pelvic, generative organs and inner thigh with blood.

intracranial trauma — referring to brain injury

in vitro — outside the living organism or in an artificial environment, such as culturing cells in a test tube.

lobotomy — a more drastic form of psychosurgery where most often an incision is made between the frontal lobes to relieve a mental disorder.

molecular biology — a branch of biology which studies the physical and chemical organization of living matter.

mongoloid — preferably referred to as Down's syndrome. Mongolism is a congenital chromosomal disorder in which there is an extra chromosome. The additional chromosome has been translocated. The children who have this disorder are physically and mentally retarded.

mutation — a change in a gene that is carried to offspring cells. A mutation is sometimes harmful.

National Academy of Science (NAS) — a professional organization of scientists and engineers dedicated to the advancement of science and its use for the general welfare.

NIH — National Institute of Health, located in Bethesda, Maryland

pathologist — a physician who specializes in the study of the anatomical and the physiological changes that occur in disease or injury and the reason(s) for those changes.

perfusion — forcing a fluid through an organ or tissue, often by the way of the blood vessels.

phenotype — the observable characteristics of an individual. The phenotype results from the interaction of the genotype and the environment. The term may also apply to the trait produced by a single gene or several genes.

phenylketonuria — a hereditary disorder characterized by an elevation of blood phenylketones, because the body cannot metabolize the products of phenylalanine normally. It is associated with mental retardation.

placebo — often called a "sugar pill," is usually an inert substance which has no effect physically but may offer psychological satisfaction. In some patients a physical response may also occur because the patient experiences some mental relief. Placebos are usually used in controlled experiments to determine whether the effects of the "test" drug are real and not simply the psychological effects resulting from "taking a pill."

placenta — the organ that unites the fetus to the uterus and where the blood of the mother and fetus exchange metabolic substances.

placental barrier — referring to the ability of the placenta to selectively filter such substances as chemicals, drugs and bacteria.

plasma renin — plasma is the liquid portion of the blood. The blood cells float in it. Renin, which is produced by the kidney, may be a substance found in the plasma. It causes blood vessels to constrict, producing a hypertensive effect on the body.

plasmids — a general term referring to cytoplasmic components of a cell that replicate autonomously.

pneumonia — inflammation of the lung(s), particularly the aeveolar portion, resulting in their being clogged with mucus and blood.

previable — incapable of living outside the uterus.

prognosis — the probable outcome of a disease or injury

prophylactic — warding off of disease either through mechanical, chemical or pharmacological means.

rabies — an acute virus disease transmitted by the bite of a rabid animal. It is characterized by central nervous system irritation followed by paralysis and often death.

recessive gene — a functional attribute of the gene. The effect of a recessive gene is masked if the allele of the gene is dominant.

regression — to move backward to a more primitive or earlier state of development.

renal — pertaining to the kidney

reticuloendothelial — a group of cells which are found in the bone marrow, liver and spleen. They are involved in the making of new blood cells and in breaking down old ones.

schizophrenia — a form of mental illness characterized by a loss of contact with one's environment. Emotion, thought and behavior are not working in a coordinated manner. Delusions, hallucinations and reverting to childlike behavior are often among the symptoms.

sickle-cell anemia — a chronic anemia occurring prodominantly in Blacks. It is characterized by an irregularly sickle-shaped red blood cell due to homozygous inheritance of an abnormal hemoglobin gene and affects the blood's ability to carry sufficient oxygen.

sperm bank — the storage of frozen sperm for use in artificial insemination.

spontaneous abortion — an abortion is the expelling of a fetus before viability. A spontaneous abortion is one which occurs without interference or immediately known cause.

Staphylococcus aureus — a gram positive, berry-shaped microorganism. It is characterized by the production of a golden yellow pigment. It is an important cause of such conditions as boils, carbuncles and internal abcesses.

syncope — fainting, a transient form of unconsciousness.

Tay-Sachs disease — a hereditary disease primarily of Ashkenazie Jews who inherit two recessive genes, one from each parent. An enzyme, hexominodase A, is not produced and because of this a fatty-like substance accumulates in the brain cells and other nervous tissue, causing the cells to rupture and die. Gradually the baby loses motor skills, becomes mentally retarded, blind and deaf. Death usually occurs at the age of two or three years of age.

Teflon-shunted cannula — a Teflon tube inserted into a vein or other passageway to divert the flow of substance. In the case of dialysis patients it permits a convenient way to connect the patient with the machine.

trisomy 18 — trisomy refers to the presence of three rather than two in a particular set of chromosomes. In this case, there is an extra chromosome 18.

Tuskegee syphilis study — a study which involved syphilitic black men. One group was not given treatment so that the full course of the disease could be followed and evaluated medically.

ultra-sound — a technique which uses sound waves beyond the scope of human hearing for diagnostic purposes. The sound waves are recorded, allowing the physician to examine such structures as the valves of the heart, abdomen and arterial blood flow.

uremia — a severe toxic condition caused by retention of substances normally excreted in urine. This is brought about by any condition which blocks the production or secretion of urine by the kidneys.

viable — capable of living outside of the uterine cavity.